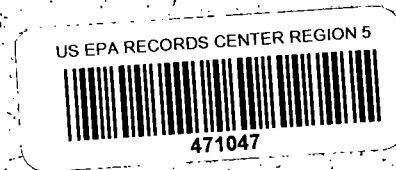


Health and Safety Plan



for the . . .

Remedial Investigation and Feasibility Study

of the . . .

Albion-Sheridan Township Landfill
Albion, Michigan
May, 1992

prepared for . . .

U.S. Environmental Protection Agency
Region V
Chicago, Illinois

EPA Contract No. 68-W8-0079
EPA Work Assignment No. 11-5LAN
WW Engineering & Science Project No. 04011

WW Engineering & Science



**REMEDIAL INVESTIGATION/FEASIBILITY STUDY
HEALTH AND SAFETY PLAN
ALBION-SHERIDAN TOWNSHIP LANDFILL
ALBION, MICHIGAN**

Prepared for

**U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION V
CHICAGO, ILLINOIS**

**EPA CONTRACT NO. 68-W8-0079
EPA WORK ASSIGNMENT NO.11-5LAN**

Prepared by

**WW ENGINEERING & SCIENCE
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MAY 1992

PROJECT 04011

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION V

SITE HEALTH AND SAFETY PLAN

Date: May 1, 1992

Prepared by: WW Engineering & Science

Project Name: Albion-Sheridan Township Landfill
Albion, Calhoun County, Michigan

U.S. EPA Site I.D. #: MID 980504450

WWES Corporate Safety Director: Ted Cline

WWES - ESD Occupational Health and Safety Officer: Bert Webb

WWES Project Manager: Elizabeth M. Uhl

WWES Site Supervisor: Mike Potter

WWES Site Health & Safety Officer: Rick Trippel

GLOSSARY OF ACRONYMS AND DEFINITIONS

ACGIH	American Conference of Governmental Industrial Hygienists
ANSI	American National Standards Institute
APR	Air purifying respirator
CFR	Code of Federal Regulations
CGI	Combustible gas indicator
Clean Zone	Support zone
CSEP	Confined Space Entry Permit
DECON	Decontamination
FID	Flame ionization detector
Hot Zone	Exclusion zone
IDLH	Immediately dangerous to life and health
LEL	Lower explosive limit
MDNR	Michigan Department of Natural Resources
NIOSH	National Institute for Occupational Safety & Health
OSHA	Occupational Safety & Health Administration
OVA	Organic vapor analyzer
OVM	Organic vapor monitor
PEL	Permissible exposure limit
PM	Project Manager
PPB	Parts per billion
PPE	Personal protective equipment
PPM	Parts per million
RPM	Remedial Project Manager
SCBA	Self-contained breathing apparatus
SOP	Standard operating procedure
SHSO	Site Health & Safety Officer
SHSP	Site Health & Safety Plan
STEL	Short-term exposure limit (15 minutes)
TLV	Threshold limit value
TWA	Time-weighted average (8-hour)
U.S. EPA	United States Environmental Protection Agency

INTRODUCTION AND SITE ENTRY REQUIREMENTS

This document describes the health and safety guidelines developed for the field investigation activities at the Albion-Sheridan Township Landfill Site to protect on-site personnel, visitors and the public from physical injury and/or exposure to hazardous substances. The procedures and guidelines contained herein are based on the best available information at the time of the plan's preparation. Specific requirements will be revised when and if new information is received or conditions change significantly from original indications. A written amendment will document all changes made to this plan and all such amendments will be included in Attachment A. All work will be performed in accordance with the provisions, guidelines and procedures of this Site Health & Safety Plan (SHSP) and the requirements of applicable OSHA regulations in 29 CFR Part 1910 and/or 29 CFR Part 1926. Failure to comply with these requirements may result in dismissal from the site.

DAILY SAFETY MEETING

Daily safety meetings will be held at the start of each work day to address worker health and safety concerns, communicate previously unidentified hazards to all involved parties, and to help ensure that personal protective equipment (PPE) is being issued and used correctly and that all personnel understand site conditions and operating procedures.

SITE HEALTH & SAFETY PLAN ACCEPTANCE

The SHSO or designated representative is responsible for informing all personnel required to enter exclusion and/or decontamination zones of the contents of this plan and obtaining each such person's signature on the Site Health & Safety Plan Acknowledgment Form included in Attachment Z. By signing the acknowledgement form individuals are recognizing the potential hazards on site and appropriate work practices, procedures, and policies necessary to control such hazards and minimize exposure or adverse effects of such hazards.

TRAINING REQUIREMENTS

All personnel (including visitors) required to enter exclusion or decontamination zones must have completed initial Hazardous Waste Operations and Emergency Response (HAZWOPER) health and safety training in accordance with 29 CFR 1910.120(e) and associated up-to-date refresher training, if applicable, or be qualified by previous training and experience. Documentation of compliance with these training requirements is the responsibility of each employer. The SHSO is responsible for obtaining copies of all such

documentation from each employer, and maintaining an on-site record of all involved trained personnel for the duration of the field investigation. At the minimum the HAZWOPER training shall include:

- General safety rules
- Basic chemical safety
- Basics of toxicology and applicable physiology
- Hazardous materials types and characteristics
- Hazard communication information
- Respiratory protective equipment
- Respirator training
- Personal protective equipment including chemical protective clothing
- Decontamination procedures and layouts
- Work zones and site control measures
- Fire/explosion hazards prevention and protection
- Heat stress, cold stress and physical hazards
- Confined space entry procedures
- First aid/emergency response procedures
- Air monitoring equipment and procedures
- U.S. EPA Levels of Protection (i.e., A,B,C and D)
- Exposure guidelines
- Applicable federal and state regulations

MEDICAL MONITORING REQUIREMENTS

All personnel (including visitors) required to enter exclusion or decontamination zones must have been examined within the past 12 months by a qualified physician, and deemed medically and physically fit by such physician to wear required PPE under conditions likely to be encountered at this site, including, but not necessarily limited to, heat stress and cold stress, in accordance with 29 CFR 1910.120(f) and 29 CFR 1910.134. Documentation of compliance with these medical monitoring requirements is the responsibility of each employer. Employers shall obtain and furnish covered employees with a copy of the written opinion from the attending physician pertaining to these requirements in accordance with 29 CFR 1910.120(F)(7). If additional medical and/or biological monitoring requirements arise during the course of the investigation, they will be clearly stated in a written amendment to be included in Attachment A, and promptly communicated to all involved personnel.

FIT TESTING REQUIREMENTS

All personnel (including visitors) required to enter exclusion or decontamination zones with the potential necessity of using respiratory protective equipment must have successfully passed at least a qualitative respirator fit test, in accordance with 29 CFR 1910.134, within

the past 12 months. Documentation of compliance with fit testing requirements is the responsibility of each employer. All employers whose employees may be required to wear respiratory protective equipment must have written standard operating procedures governing the selection, use, maintenance, and inspection of respirators, and all covered employees must be properly trained in those procedures.

1.0 SITE BACKGROUND AND SCOPE OF WORK

1.1 ROLES AND RESPONSIBILITIES

REMEDIAL PROTECT MANAGER (RPM)

The RPM, acting on the U.S. EPAs behalf, manages remedial activities. The RPM is accountable for the technical quality, schedule and cost of the work. As in most management situations, the RPM does not have the authority or control over external factors which may impact the investigation. Instead, the RPM must develop a good management approach and draw on interpersonal skills to facilitate needed coordination and communication among the various organizations and individuals involved in the investigation.

SITE HEALTH AND SAFETY OFFICER (SHSO)

The SHSO is responsible for coordinating and enforcing health and safety procedures for all on-site personnel. All U.S. EPA health and safety guidelines and requirements as well as all applicable OSHA standards shall be followed. Each contractor, however, as an employer under OSHAs jurisdiction, is responsible for the health and safety of its employees. The following procedures shall be followed in the event of a dispute with regard to health and safety issues:

1. Attempt to resolve the issue on site through discourse with all involved parties and document in writing the source of the dispute and the agreed-upon resolution;
2. If the issue cannot be resolved on site, the SHSO (and others) shall consult off-site supervisors for assistance. Until the issue is satisfactorily resolved, the specific task/operation in dispute shall be discontinued.
3. The SHSO has the authority to order the prompt shut-down of operations at the site if any operation threatens worker or public health or safety.

1.2 KEY PERSONNEL

Note: Any individual who observes an unsafe work practice and/or discovers a previously unidentified hazard shall promptly report their concerns/observations to appropriate key personnel listed below.

U.S. EPA Remedial Project Manager (RPM)	Mary Beth Novy (312) 353-7556
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Alternate U.S. EPA RPM	Mary Pat Tyson (312) 886-3006
MDNR Site Project Manager	Gene Hall (517) 373-6808
Principal ARCS Contractor	WW Engineering & Science (WWES) 5555 Glenwood Hills Parkway, SE Grand Rapids, MI 49588-0874 (616) 942-9600
WWES Corporate Safety Director	Ted Cline (616) 942-9600, Ext. 294 (work) (616) 874-6236 (home)
WWES-ESD Occupational Health and Safety Officer	Bert Webb (616) 942-9600, Ext. 405
WWES Project Manager (PM)	Elizabeth M. Uhl (616) 942-9600, Ext. 404
WWES Site Health & Safety Officer (SHSO)	Rick Trippel (616) 942-9600, Ext. 451
WWES Site Supervisor	Mike Potter (616) 942-9600, Ext. 336
Subcontractor(s)	to be determined

1.3 SITE BACKGROUND

The Albion-Sheridan Township Landfill site (the "site") is a former landfill located approximately 1 mile east of Albion, Michigan in Section 36 (T2S, R4W) of Calhoun County (see Figure 1). The site is also defined as Lot 27 and Lot 28 of the Supervisor's Plat and is comprised of approximately 30 acres of land. The site is bordered on the north by Michigan Avenue (U.S. Highway 99), on the east by the Calhoun/Jackson County line, and on the south by East Erie Road. The western boundary of the site is approximately 660 feet west of the Calhoun/Jackson County line.

From 1966 to 1981 the privately owned and operated landfill site accepted municipal refuse and industrial wastes from the City of Albion and nearby Sheridan Township. In the early 1970's the MDNR approved the landfill to accept sludges described as insoluble hydroxides and carbonates. Paint wastes and thinners, oil and grease, and dust, sand, and dirt containing fly ash and casting sand were also reportedly disposed of at the site. Chemical analyses of sludges conducted in 1980 by the MDNR indicate the presence of chromium (250,000 mg/kg), zinc (150,000 mg/kg) nickel (1,000 mg/kg), lead (280 mg/kg), and cyanide (2,100 mg/kg). Three monitoring wells were installed in 1980, and available data indicate the presence of metal contaminants in the ground water.

For additional background information, see the Work Plan.

1.4 SCOPE OF WORK FOR ARCS CONTRACTOR

- Task 1 Survey the site
- Task 2 Install security fence
- Task 3 Conduct a geophysical survey
- Task 4 Conduct a soil gas survey
- Task 5 Collect soil samples from borings drilled within waste areas identified during Tasks 3 and 4
- Task 6 Install monitoring wells
- Task 7 Collect ground water samples from each monitoring well
- Task 8 Collect subsurface soil samples at each monitoring well location
- Task 9 Collect water samples from residential wells
- Task 10 Perform aquifer tests
- Task 11 Conduct geophysical logging in wells which penetrate shallow bedrock
- Task 12 Collect surface soil samples
- Task 13 Collect surface water samples
- Task 14 Collect sediment samples
- Task 15 Collect samples of landfill cap materials

2.0 TASK SAFETY AND HEALTH RISK ANALYSIS

This safety and health risk analysis identifies the general site hazards, task-specific hazards, and health hazard data on hazardous substances which may be encountered during the investigation. Hazards which cannot be eliminated must be mitigated by use of engineering controls, safe work practices/administrative controls, and/or specification and use of appropriate personal protective equipment (PPE).

2.1 GENERAL SITE HAZARDS AND ASSOCIATED PRECAUTIONS

2.1.1 LIGHTING

Work areas shall have adequate lighting for workers to easily see to work and identify hazards (5-foot candles minimum, comparable to a 75-100 watt incandescent bulb). Personnel should carry flashlights in all normally dark areas for use in the event of a power failure. The requirements of 29 CFR 1910.12(m) shall apply. If work must be conducted during other than daylight hours, this SHSP shall be amended accordingly.

2.1.2 ELECTRICAL POWER

All electrical equipment shall have a ground fault circuit interrupter (GFCI) as part of the circuit. All equipment must be suitable and approved for the class of hazard. The requirements of 29 CFR 1926 Subpart K shall apply.

To help minimize electrical hazards, low voltage (12v) equipment with GFCI's and water-tight, corrosion resistant connecting cables shall be used when possible. In addition, weather shall be monitored and all on-site work activities shall be suspended during electrical storms.

2.1.3 DRUM HANDLING

Should drums be encountered, any movement or opening of drums shall be done in accordance with the requirements of 29 CFR 1910.120(j) and Attachment G, Drum Handling Procedures.

2.1.4 COLD STRESS

Whenever the temperature is below 40°F, cold stress protocol shall be followed. Workers must be supplied with adequate clothing to maintain core temperature. Cold stress is discussed in further detail in Attachment B.

2.1.5 HEAT STRESS

Whenever the temperature exceeds 70°F and workers are wearing chemical protective clothing and/or respiratory protective equipment, an appropriate heat stress monitoring program shall be implemented. Workers shall have access to rest periods and cooled drinking water to be located in the support zone as necessary. Heat stress is discussed in further detail in Attachment C.

2.1.6 EYE WASH UNITS

All operations involving the potential for eye injury due to splashes and/or irritation shall have approved eye wash unit(s) locally available (i.e., within 100 feet, or 10 second access time of the hazard) in accordance with 29 CFR 1910.151 and ANSI Z 358.1 - 1981.

2.1.7 FIRE PREVENTION/PROTECTION

All operations and activities involving the potential for fire/explosion hazards shall be conducted in a manner so as to minimize such risk. Non-sparking tools shall be used and fire extinguishers shall be available for all such operations/activities. When necessary, intrinsically safe and/or explosion proof equipment and instruments shall be used. Bonding or grounding, in accordance with Attachment F, will be used for all applicable liquid transfers. Continuous monitoring with a CGI/oxygen meter will be used during all operations involving flammable substances.

2.1.8 UTILITIES

Overhead and underground utility hazards shall be identified and/or inspected prior to conducting operations involving potential contact.

2.1.9 WEATHER CONDITIONS

Weather conditions shall be monitored by the SHSO and records shall be kept of ambient temperature, barometric pressure, and wind speeds and direction as obtained from local meteorological sources. The data will be used to assist the SHSO in the assessment of cold stress and heat stress monitoring requirements and associated precautions as described respectively in Attachments B and C. In addition, all activities will be suspended during electrical storms and/or other adverse conditions as deemed appropriate by the SHSO.

2.1.10 BIOLOGICAL HAZARDS

Although not anticipated, wastes from hospitals which may contain disease-causing organisms that could infect site personnel could be encountered. If such wastes are encountered personnel shall promptly leave the subject area and immediately notify the SHSO. The presence of such wastes will require appropriate amendments to this plan. Other biological hazards that might be present include poisonous plants, insects, and feral animals. The use of appropriate PPE and thorough washing of any exposed body parts and equipment will help reduce the chances of exposure and help protect against infection. All personnel shall conduct daily self-examinations at the end of the work day for the presence of ticks. Should any ticks be found, such information shall be promptly reported to the SHSO.

2.2 SAFETY AND HEALTH RISK ANALYSIS VS. SITE TASK/OPERATION

A safety and health risk analysis vs. site task operation is summarized in Table 1. The following text table is an expanded presentation.

TASK	POTENTIAL HAZARD	PRECAUTIONS
1. Survey site	<ul style="list-style-type: none">• Contact with contaminated soils• Heat stress• Cold stress	<ul style="list-style-type: none">• Use appropriate PPE as specified in Section 4.• Do not kneel or sit on ground.• Follow decon procedures specified in Section 8.• Increase number and duration of rest breaks as necessary.• Slightly increase salt consumption in diet, if necessary. DO NOT USE SALT TABLETS!• Increase water intake.• See Attachment C, Heat Stress.• Limit exposure time to cold temperatures, wind and precipitation.• Keep dry.• Wear several layers of clothing.• See Attachment B, Cold Stress.

- Physical injury
 - Be alert for slip, trip and fall hazards.
 - Follow safe work practices specified in Section 7.2.

- 2. Install security fence
 - Contact with contaminated soils.
 - Heat stress
 - Cold stress
 - Physical injury
 - See reference above.
 - See reference above.
 - See reference above.
 - Avoid direct skin contact with metal surfaces/objects.
 - See reference above.

- 3. Conduct geophysical survey
 - Contact with contaminated soils.
 - Heat stress
 - Cold stress
 - Physical injury
 - See reference above.
 - See reference above.
 - See reference above.
 - See reference above.

- 4. Conduct soil gas survey
 - Inhalation
 - PID/FID readings in workers' breathing zones.
 - See Action Levels specified in Section 6.
 - Use respiratory protective equipment as necessary and appropriate.
 - See reference above.
 - Use appropriate PPE as specified in Section 4.
 - Avoid direct skin contact with wet equipment surfaces.
 - See reference above.
 - See reference above.
 - Contact with contaminated soils
 - Contact with contaminated liquids
 - Cold stress
 - Physical injury

- 5. Collect soil samples
 - Inhalation
 - Contact with contaminated soils
 - Heat stress
 - Contact with contaminated liquids
 - Cold stress
 - Physical injury
 - See reference above.
 - See reference above.
 - See reference above.
 - See reference above.
 - See reference above.
 - See reference above.

- 6. Install monitoring wells
 - Inhalation
 - Contact with contaminated soils
 - See reference above.
 - See reference above.

- | | | |
|------------------------------------|---|--|
| | <ul style="list-style-type: none"> • Noise | <ul style="list-style-type: none"> • Maintain appropriate distance from source(s). |
| | <ul style="list-style-type: none"> • Heat stress • Potential fire/explosion | <ul style="list-style-type: none"> • Use hearing protection devices (e.g., ear plugs) with sufficient noise reduction rating (NRR). • See reference above. • CGI monitoring: cease activities if readings $\geq 20\%$ LEL. • Eliminate ignition sources. • Fire extinguishers (ABC) to be readily available. • Non-sparking tools, if necessary. |
| | <ul style="list-style-type: none"> • Contact with contaminated liquids • Cold stress • Collapse of structure on person | <ul style="list-style-type: none"> • See reference above. • See reference above. • DO NOT enter excavated areas unnecessarily. • DO NOT place yourself beneath operating equipment. • Place drill rig on level ground. • See reference above. • Mobile drilling rigs equipped with kill switches. • DO NOT wear loose clothing or jewelry around rotating equipment. • Check clearance. • Maintain a minimum distance of 15' from lines. • De-energize, if necessary. |
| | <ul style="list-style-type: none"> • Physical injury | <ul style="list-style-type: none"> • Use all PPE specified in Section 4. • Review MSDS information in Attachment E. |
| | <ul style="list-style-type: none"> • Overhead power lines | |
| | <ul style="list-style-type: none"> • Skin | |
| 7. Collect ground water samples | <ul style="list-style-type: none"> • Contact with contaminated liquids • Cold stress • Physical injury • Skin | <ul style="list-style-type: none"> • See reference above. • See reference above. • See reference above. • See reference above. • See reference above. |
| 8. Collect subsurface soil samples | <ul style="list-style-type: none"> • Inhalation • Contact with contaminated soils • Noise | <ul style="list-style-type: none"> • See reference above. • See reference above. • See reference above. |

	<ul style="list-style-type: none"> • Potential fire/explosion • Contact with contaminated liquids. • Cold stress • Collapse of structure on person • Skin 	<ul style="list-style-type: none"> • See reference above. • See reference above. • See reference above. • See reference above. • See reference above.
9. Collect residential well samples	<ul style="list-style-type: none"> • Physical injury • Contact with contaminated liquids • Skin 	<ul style="list-style-type: none"> • See reference above. • See reference above. • See reference above.
10. Perform aquifer tests	<ul style="list-style-type: none"> • Contact with contaminated liquids • Physical injury 	<ul style="list-style-type: none"> • See reference above. • See reference above.
11. Conduct geophysical logging	<ul style="list-style-type: none"> • Contact with contaminated soils • Contact with contaminated liquids • Cold Stress • Physical injury • Skin 	<ul style="list-style-type: none"> • See reference above. • See reference above. • See reference above. • See reference above. • See reference above.
12. Collect surface soil samples	<ul style="list-style-type: none"> • Contact with contaminated soils • Physical injury 	<ul style="list-style-type: none"> • See reference above. • See reference above.
13. Collect surface water samples	<ul style="list-style-type: none"> • Contact with contaminated liquids • Cold stress • Physical injury 	<ul style="list-style-type: none"> • See reference above. • See reference above. • See reference above. • Use USCG-approved personal flotation device if river entry is required.
14. Collect sediment samples	<ul style="list-style-type: none"> • Contact with contaminated soils • Cold stress • Physical injury 	<ul style="list-style-type: none"> • See reference above. • See reference above. • See reference above. • Use USCG-approved. as referenced above.
15. Air monitoring network	<ul style="list-style-type: none"> • Inhalation • Heat stress • Cold stress 	<ul style="list-style-type: none"> • See reference above. • See reference above. • See reference above.

- | | | |
|----------------------------------|-----------------------------------|------------------------|
| | • Physical injury | • See reference above. |
| | • Skin | • See reference above. |
| 16. Collect landfill cap samples | • Inhalation | • See reference above. |
| | • Contact with contaminated soils | • See reference above. |
| | • Heat stress | • See reference above. |
| | • Cold stress | • See reference above. |
| | • Physical injury | • See reference above. |
| | • Skin | • See reference above. |

2.3 HEALTH HAZARD ANALYSIS

A health hazard analysis is presented in Table 2.

3.0 TRAINING AND FIT TESTING REQUIREMENTS

Refer to Introduction and Site-Entry Requirements.

4.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

The following is a brief description of the PPE which may be required during various phases of the investigation. The U.S. EPA terminology for PPE ensembles will be used, (i.e., A,B,C and D).

Respiratory protective equipment must be NIOSH/OSHA-approved and use of such equipment shall be in accordance with the Requirements of 29 CFR 1910.134. Cartridges for air purifying respirators must be changed at least daily. A written record of all tasks which require the use of respiratory protective equipment shall be maintained by the SHSO, and shall include the name and title of each individual who wears such equipment and the duration of such wearing.

4.1 LEVEL A PPE shall consist of:

- Fully encapsulated chemical protective suit;
- Chemical-resistant boot covers;
- Steel-toed/steel-shank safety boots;
- 4H or Silver Shield outer gloves;
- Nitrile or neoprene inner gloves;
- Positive pressure/pressure demand self-contained breathing apparatus (SCBA);
- and
- Hard hat.

LEVEL A work requires a minimum of four persons and will be conducted if:

- Extremely hazardous substances are encountered which require the highest level of protection for skin, eyes, and the respiratory system;
- Substances with a high degree of hazard to the skin are shown to be present;
- Airborne chemical concentrations, as determined by direct reading instruments, are at or above IDLH levels; or
- Biological hazards requiring isolation are encountered.
- **LEVEL A WORK WILL NOT BE UNDERTAKEN WITHOUT ADDITIONAL AUTHORIZATION**

4.2 LEVEL B PPE shall consist of:

- Chemical-protective coveralls, e.g., Saranax, Tyvek, or Barricade;
- Chemical-resistant boot covers;
- Steel-toed/steel shank safety boots;
- 4H or Silver Shield outer gloves;
- Latex, nitrile or neoprene inner gloves;
- Positive pressure/pressure demand SCBA or airline respirator equipped with at least a 5-minute egress bottle;
- Hard hat; and
- All junctions of coveralls with gloves and boot covers joined with duct tape.

LEVEL B work requires a minimum of 3 persons and will be conducted if:

- The identified substances require a high level of respiratory protection but do not present a potent skin hazard;
- Airborne concentrations of chemicals, as determined by direct reading instructions, are at or above IDLH levels; exceed the maximum use concentration for full-face air purifying respirators; or exceed the reported maximum concentration specification for the select cartridges;
- An oxygen deficient (<19.5%O₂) atmosphere is encountered; or
- Confined space work requires Level B.

4.3 LEVEL C PPE shall consist of:

- The PPE specified for Level B with full-face air-purifying respirators (APR's) equipped with appropriate cartridges substituted for the selected supplied air system.

LEVEL C work requires a minimum of 2 persons and will be conducted if:

- The types of airborne contaminants have been identified, concentrations have been measured and cartridges are available that will remove the contaminants;
- The contaminants have adequate coating properties, i.e., sufficiently protective odor threshold and/or irritant properties, and all other criteria for the use of APR's have been met; or
- The same level of skin protection, but a lower level of respiratory protection, as Level B is required for the identified contaminants.

Note: Level C can NOT be used in IDLH or oxygen-deficient atmospheres.

4.4 LEVEL D PPE shall consist of:

- Basic field work uniform or coveralls;
- Steel-toed/steel shank safety boots;
- Safety glasses, chemical goggles or face shield;
- Hard hat; and
- Chemical protective gloves (provisional).
- Polyethylene-coated Tyvek or Saranex-coated Tyvek, where non-disposable clothing could be otherwise contacted by splashes (provisional).

LEVEL D work requires a minimum of 2 persons and will be conducted if:

- The work atmosphere contains no contaminants at levels exceeding established exposure guidelines; and
- Work functions preclude splashes with, immersion or the potential for unexpected inhalation of, or contact with, harmful concentrations of hazardous substances.

4.5 ANTICIPATED LEVELS OF PROTECTION

Based on the best currently available information regarding this site, it is anticipated that most, if not all, work activities will be conducted in Level D. Air monitoring results will be used to determine task-specific levels of protection as discussed in Section 6.

5.0 MEDICAL MONITORING REQUIREMENTS

Refer to Introduction and Site-Entry Requirements.

6.0 AIR MONITORING PROGRAM AND ACTION LEVELS

In accordance with the Requirements in 29 CFR 1910-120(h), air monitoring shall be used to identify and quantify airborne concentrations of hazardous substances and other health hazard conditions in order to determine the appropriate levels of protection throughout the investigation.

6.1 ROUTINE AIR MONITORING REQUIREMENTS

Air monitoring will be required under the following conditions:

- Upon initial entry to rule out IDLH and/or explosive atmospheres;
- When the possibility of an IDLH or explosive atmosphere has developed;
- When work begins on a different portion of the site;
- When unsuspected and/or unknown contaminants are encountered;
- When a different type of operation is initiated;
- When workers are handling leaking drums or containers, or working in areas with obvious liquid contamination;
- When work activities result in the generation of airborne particulates; and
- During any confined space work.

All air monitoring data will be recorded and submitted to the SHSO. A file of all such data will be maintained in the site trailer for the duration of the investigation. All instruments will be calibrated and maintained in accordance with manufacturers' specifications and all calibration and maintenance data will be recorded in dedicated logbooks.

6.2 SITE SPECIFIC AIR MONITORING REQUIREMENTS

A portable aerosol monitor will be used to determine airborne particulate concentrations during all field activities. If dust suppression techniques are not sufficient to maintain levels of airborne particulates below 100 ug/m³ (0.100 mg/m³) in the worker's breathing zones, workers must don air purifying respirators. Additional air monitoring will consist at the minimum of the following for Tasks 4, 5, 6, 8, and 16:

<u>Instrument</u>	<u>Analyte(s)</u>	<u>Frequency</u>	<u>Action Level</u>
Combustible Gas Indicator (CGI)	Explosive/Flammable atmosphere	Continuous during drilling	Cease activities, eliminate ignition sources, and vacate area if \geq 20% LEL

Oxygen meter	Oxygen	Continuous for any confined space work	Supplied air if <19.5%; vacate if >23.5%.
PID or FID	Organics	Continuous or hourly dependent on consistency of readings.	Upgrade to Level C if >5 ppm in workers' breathing zones; Level B if >50 ppm in workers' breathing zones.
Cyanide monitox	Hydrogen cyanide	Continuous during drilling in "sludge" area.	Promptly vacate if >10 ppm.

All PID/FID readings shall be taken in the worker's breathing zones.

Additional monitoring may be required as the investigation progresses. Any additional monitoring may be required as the investigation progresses. Any additional monitoring requirements will be documented by a written amendment to be included in Attachment A.

7.0 SITE CONTROL AND STANDING WORK ORDERS

Refer to Introduction and Site Entry Requirements regarding site control.

7.1 WORK ZONES

In accordance with the proposed work plan a security fence will be installed around the perimeter of the site. Once installed, appropriate warning signs will be clearly posted along the fence (e.g., "WARNING - HAZARDOUS WASTE SITE - AUTHORIZED PERSONNEL ONLY"). Individual exclusion zones will be established around each specific site investigation/activity area with a decontamination zone for small equipment, tool and personal decontamination located immediately adjacent to each specific exclusion zone. Decontamination will be performed after the completion of each activity and prior to vehicle entry for relocation on the site. A separate decontamination area will be established for the decontamination of larger equipment and vehicles. The support zone with a field trailer will be located near the entranceway to the site. A generalized work zone location map is presented in Figure 3.

7.2 FIELD SAFETY STANDING WORK ORDERS

- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited in any area designated contaminated.
- Hands and face must be thoroughly washed upon leaving the work area.
- Whenever decontamination procedures for outer garments are in effect, the entire body should be thoroughly washed as soon as possible after the protective garment is removed.
- No facial hair which interferes with a satisfactory fit of the mask-to-face-seal is allowed on personnel required to wear respirators.
- Contact with contaminated or suspected contaminated surfaces should be avoided. Whenever possible, do not walk through puddles, leachate, discolored surfaces, kneel, and do not lean, sit, or place equipment on the ground.
- Medicine and alcohol can potentiate the effects from exposure to toxic chemicals. Prescribed drugs should not be taken by personnel at hazardous waste operations where the potential for adsorption, inhalation, or ingestion of toxic substances exists unless specifically approved by a qualified physician. Alcoholic beverage intake should be minimized or avoided.
- All personnel must be familiar with standard operating safety procedures and any additional instructions and information contained in the Site Health and Safety Plan.
- All personnel must adhere to the information contained in the Site Health and Safety Plan.
- Contact lenses cannot be worn when respiratory protection is required or when the hazard of a splash exists.
- Personnel will be aware of symptoms for toxic chemicals on-site and for heat and cold stress.
- Respirators shall be cleaned and disinfected after each day's use or more often if necessary.

- Prior to donning, respirators will be inspected for worn or deteriorated parts. Emergency respirators or self-contained devices will be inspected at least once a month and after each use.
- All workers will be familiar with all sections of the established respirator program.
- All personnel going on-site must be adequately trained and thoroughly briefed on anticipated hazards, equipment to be worn, safety practices to be followed, emergency procedures, and communications.
- All required respiratory protective devices and clothing must be worn by all personnel going into areas designated for wearing protective equipment.
- Personnel on-site must use the buddy system (pairs) when wearing respiratory protective equipment. As a minimum, a third person, suitably equipped as a safety backup, is required during extremely hazardous entries.
- Visual contact must be maintained between pairs on-site and safety personnel. Entry team members should remain close together to assist each other during emergencies.
- During continual operations, on-site workers act as safety backup to each other. Off-site personnel provide emergency assistance.
- Personnel should practice unfamiliar operations prior to doing the actual procedure.
- Entrance and exit locations must be designated and emergency escape routes delineated. Warning signals for site excavation must be established.
- Communications using radios, hand signals, or other means must be maintained between initial entry members at all times. Emergency communications should be prearranged in case of radio failure, necessity for evacuation of site, or other reasons.
- Wind indicators visible to all personnel should be strategically located throughout the site.
- Personnel and equipment in the contaminated area should be minimized, consistent with effective site operations.
- Work areas for various operational activities must be established.

- Procedures for leaving a contaminated area must be planned and implemented prior to going on-site. Work areas and decontamination procedures must be established based on expected site conditions.
- Frequent and regular inspections of site operations will be conducted to insure compliance with the Site Health and Safety Plan. If any changes in operation occur, the Site Health and Safety Plan must be modified to reflect changes.
- All electrical equipment (power tools, extension cords, instruments, radios) shall conform to the appropriate section of OSHA 29 CFR 1926.400 Subpart K.
- Fire prevention and protection (appropriate signs for flammable liquids, smoking areas, storage areas of combustible or flammable materials, etc.) shall be in accordance with OSHA 29 CFR 1926.150 Subpart F.
- All excavation work will be conducted in accordance with OSHA 29 CFR 1926.650 Subpart P.

8.0 DECONTAMINATION PROCEDURES

In general, everything that enters the exclusion zone at this site must either be decontaminated or properly discarded upon exit from the exclusion zone. All personnel, including any state and local officials, must enter and exit the hot zone through the "decon" area. Prior to demobilization, contaminated equipment will be decontaminated and inspected by the SHSO or SHSO designate before it is moved into the clean zone. Any material that is generated by decontamination procedures will be stored in a designated area in the exclusion zone until disposal arrangements are made.

All personnel must sign the "HOT ZONE ENTRY/EXIT LOG" when entering and exiting the exclusion zone.

NOTE: The type of decontamination solution to be used is dependent on the type of chemical hazards. The decontamination solution for this site is soap solution and water. Decontamination solution will be changed daily (at a minimum) and collected and stored on-site until disposal arrangements are finalized. Should the soap solution and water prove inadequate for the materials present, an appropriate alternative solvent will be selected by the SHSO or SHSO designate.

8.1 PROCEDURES FOR EQUIPMENT DECONTAMINATION

Following decontamination and prior to exit from the hot zone, the SHSO or a designated alternate shall be responsible for ensuring that the item has been sufficiently decontaminated. This inspection shall be included in the site log.

8.2 PROCEDURE FOR PERSONNEL DECONTAMINATION

Personnel decontamination will be conducted by team members operating under the "buddy system." This decontamination procedure applies to personnel at this site wearing Level B and C protection. These are the minimum acceptable requirements:

STATION 1: EQUIPMENT DROP

Deposit equipment used on site (tools, sampling devices and monitoring instruments, and radios) on plastic drop cloths. These items must be decontaminated or discarded as waste prior to removal from the exclusion zone.

STATION 2: OUTER BOOT AND OUTER GLOVE WASH AND RINSE

Scrub outer boots, outer gloves and splash suit with decontamination solution or detergent water. Rinse off using water.

STATION 3: OUTER BOOT AND GLOVE REMOVAL

Remove outer boots and gloves. If outer boots are disposable, deposit in container with plastic liner. If non-disposable, store in a clean dry place.

STATION 4: TANK CHANGE

If a person leaves exclusion zone to change air tank, this is the last step in the decontamination procedure. Air tank is exchanged, new outer gloves and boot covers donned, joints taped, and person returns to hot zone.

STATION 5: OUTER GARMENT REMOVAL

If applicable, remove SCBA back-pack and remain on air as long as possible. Remove chemical resistant outer garments and deposit in container lined with plastic. Decontaminate or dispose of splash suits as necessary.

STATION 6: RESPIRATORY PROTECTION REMOVAL

Remove hard-hat, face-piece, and if applicable, deposit SCBA on a clean surface. APR cartridges will be discarded as appropriate. Wash and rinse respirator at least daily. Wipe off and store respiratory gear in a clean, dry location.

STATION 7: INNER GLOVE REMOVAL

Remove inner gloves. Deposit in container for disposal.

STATION 8: FIELD WASH

Thoroughly wash hands and face with soap and water. Shower as soon as possible.

9.0 EMERGENCY RESPONSE

It is essential that all personnel be prepared in the event of an emergency. Emergencies can take many forms including illnesses, injuries, chemical exposure, fires, explosions, spills, leaks, releases of hazardous substances, or sudden severe weather changes. This section outlines the general procedures for handling emergency situations at the site. Emergency information will be clearly posted in the field trailer.

9.1 EMERGENCY CONTACTS

Fire: 629-3921
Police: 629-3933 (local)/629-9141 (county)/782-9443 (state)
Ambulance: 629-9431
Hospital: Albion Community Hospital, 809 W. Erie St., Albion, MI (517) 629-2191
Poison Control Center: 1-800/632-2727

Directions to the nearest hospital: (See Figure 2.)

1. Take Michigan Avenue west approximately 2 miles to Superior Street and turn left;
2. Take Superior Street south approximately 1/2 mile (4-5 blocks) to Erie Street and turn right;
3. Take Erie Street west to Albion Community Hospital at 809 W. Erie Street, Albion, MI.

The following will be completed during the mobilization task for the field investigation.

The route to the hospital was verified by _____ on _____, 1992.

Distance from the site to the hospital is _____ miles and approximate driving time is _____ minutes. The local fire and police departments and the hospital were notified of site operations by _____ on _____, 1992.

9.2 ADDITIONAL EMERGENCY NUMBERS

National Response Center	1-800-424-8802
Center for Disease Control	1-800-488-4100
U.S. EPA Region V	1-312-353-2318
CHEMTREC	1-800-424-9300

9.3 EMERGENCY EQUIPMENT

<u>Type</u>	<u>Location</u>
Mobile Telephone	WWES Field Tech's Vehicles
Two-Way Radios	Field trailer
First Aid Kits	Field trailer
Stretcher/Backboard	Field trailer
Eye Wash Units	Portable and in Field trailer
Oxygen	Field trailer
Fire Extinguishers (Type ABC)	Field trailer
Dry Absorbent	Field trailer

9.4 PERSONNEL RESPONSIBILITIES

Site Health and Safety Officer (SHSO)

The SHSO has primary responsibility for responding to and correcting emergency situations. The SHSO will:

- Take appropriate measures to protect personnel including: withdrawal from the exclusion zone, total evacuation and securing of the site, or upgrading or downgrading the level of protective clothing and respiratory protection;

- Take appropriate measures to protect the public and the environment including isolating and securing the site, preventing run-off to surface waters and ending or controlling the emergency to the extent possible;
- Ensure that appropriate federal, state, and local agencies are informed, and emergency response plans are coordinated. In the event of fire or explosion, the local fire department should be summoned immediately. In the event of an air release of toxic materials, the local authorities should be informed in order to assess the need for evacuation. In the event of a spill, sanitary districts and drinking water systems may need to be alerted;
- Ensure that appropriate "decon" treatment or testing for exposed or injured personnel is obtained;
- Determine the cause of the incident and make recommendations to prevent the recurrence; and,
- Ensure that all required reports have been prepared.

Site Supervisor (SS)

The SS must immediately report emergency situations to the SHSO, take appropriate measures to protect site personnel, and assist the SHSO as necessary in responding to and mitigating the emergency situation.

9.5 MEDICAL EMERGENCIES

Any person who becomes ill or injured in the exclusion zone must be decontaminated to the maximum extent possible. If the injury or illness is minor, full decontamination should be completed and first aid administered prior to transport. If the patient's condition is serious, at least partial decontamination should be completed (i.e., complete disrobing of the victim and redressing in clean coveralls or wrapping in a blanket.) First aid should be administered while awaiting an ambulance or paramedics. All injuries and illnesses must immediately be reported to the SHSO.

Any person transporting an injured/exposed person to a clinic or hospital for treatment should take with them directions to the hospital and information on the chemical(s) they may have been exposed to. This information is included in Attachment E - MSDS's.

Any vehicle used to transport contaminated personnel, will be cleaned or decontaminated as necessary.

9.6 FIRE OR EXPLOSION

In the event of a fire or explosion, the local fire department should be summoned immediately. Upon their arrival the SHSO or designated alternate will advise the fire commander of the location, nature, and identification of the hazardous materials on-site.

If it is safe to do so, site personnel may:

- Use fire fighting equipment available on-site; or
- Remove or isolate flammable or other hazardous materials which may contribute to the fire.

9.7 SPILL OR LEAKS

In the event of a spill or a leak, site personnel will:

- Locate the source of the spillage and stop the flow if it can be done safely; and,
- Begin containment and recovery of the spilled materials

9.8 EVACUATION ROUTES AND RESOURCES

Evacuation routes have been established by work area locations for this site. All outside work areas have been provided with two designated exit points. Evacuation should be conducted immediately, without regard for equipment under conditions of extreme emergency. See site map for evacuation routes.

- Evacuation notification will be a continuous blast on an air horn, vehicle horn, or by verbal communication via radio.
- Keep upwind of smoke, vapors or spill location.
- Exit through the decontamination corridor if possible.
- If evacuation is not via the decontamination corridor, site personnel should remove contaminated clothing once they are in a location of safety and leave it near the exclusion zone or in a safe place.

- The SHSO will conduct a head count to ensure all personnel have been evacuated safely.
- In the event that emergency site evacuation is necessary, all personnel are to:
 1. Escape the emergency situation;
 2. Decontaminate to the maximum extent practical; and,
 3. Meet at the WWES field trailer.
- In the event that the WWES field trailer is no longer in a safe zone, meet at intersection of landfill entry drive and Michigan Avenue.

10.0 CONFINED SPACE ENTRY PROCEDURES

A confined space is defined as a space or work area not designed or intended for normal human occupancy, having limited means of access and poor natural ventilation, and or any structure, including buildings or rooms which have limited means of egress. Examples include tanks, vats, and basements. Confined spaces identified at this site are listed below. If a confined space entry is conducted, it will be done in accordance with procedures presented in Attachment D.

<u>Type of Confined Space</u>	<u>Location On-Site</u>	<u>Comments</u>
Trenches	To be determined	--

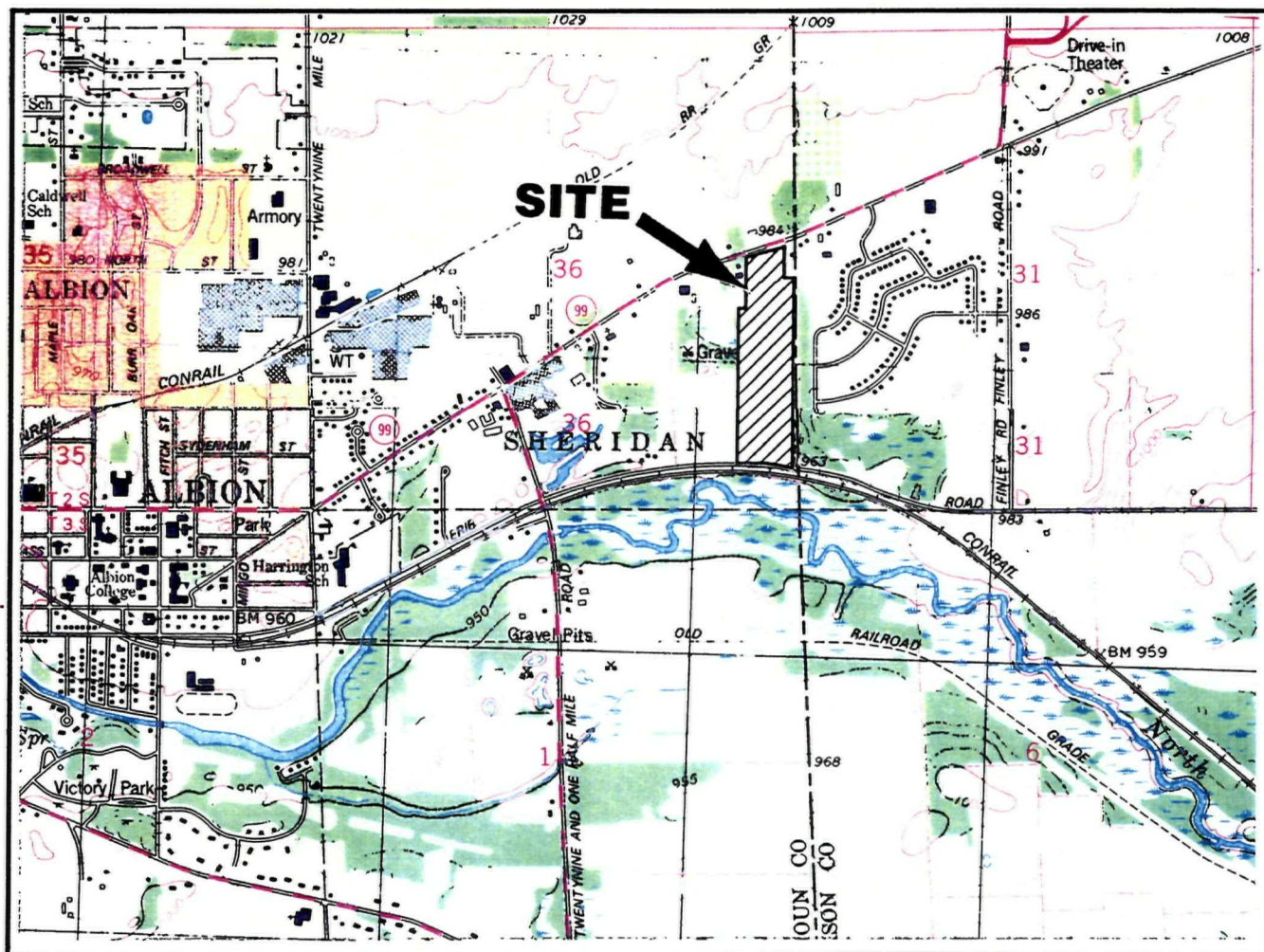
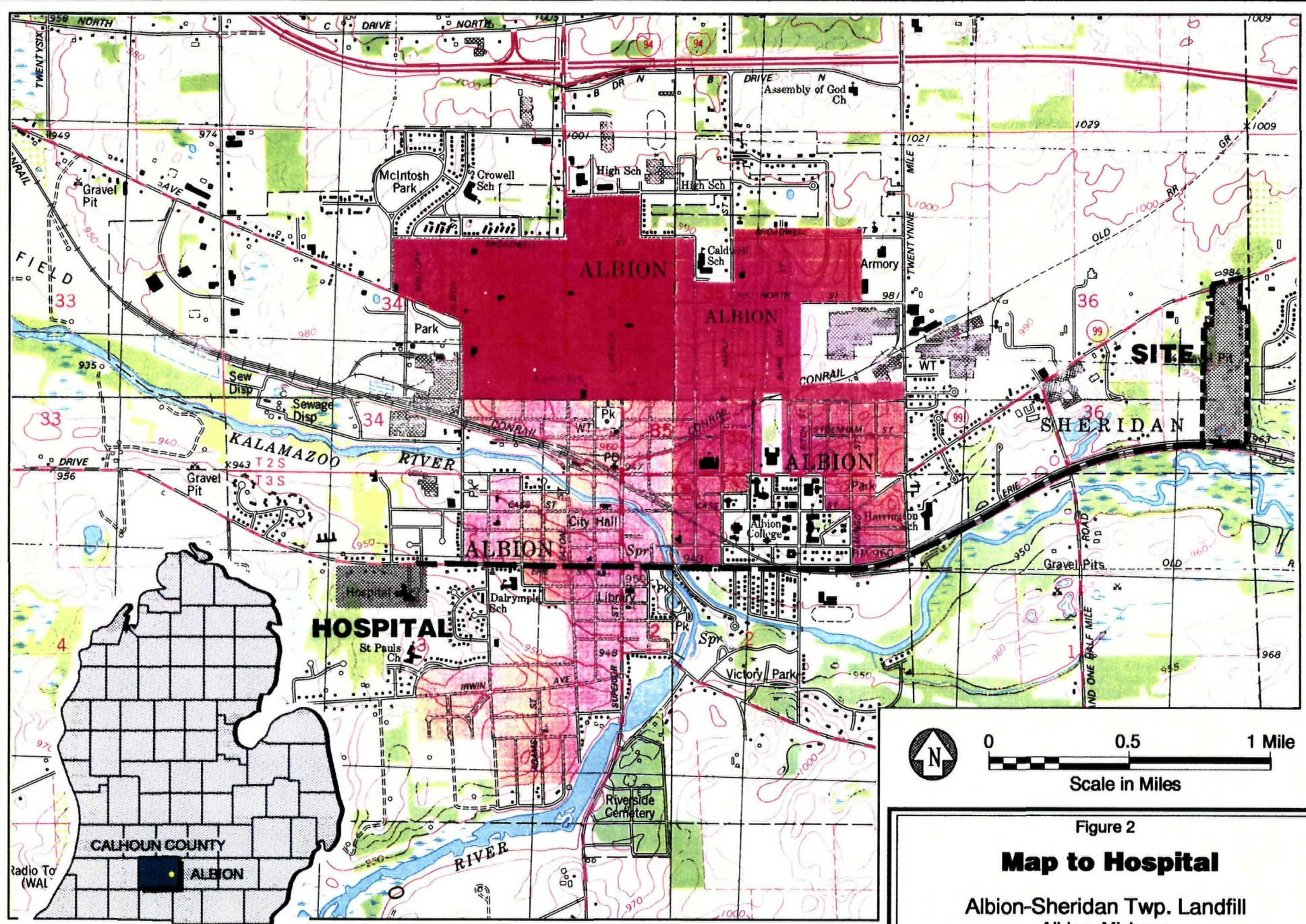


FIGURE 1

Site Location Map

ALBION-SHERIDAN TOWNSHIP LANDFILL
Albion, Michigan



N.E. Albion Quadrangle U.S.G.S., 1981

Figure 2

Map to Hospital

Albion-Sheridan Twp. Landfill
Albion, Michigan

February 1992

04011.01

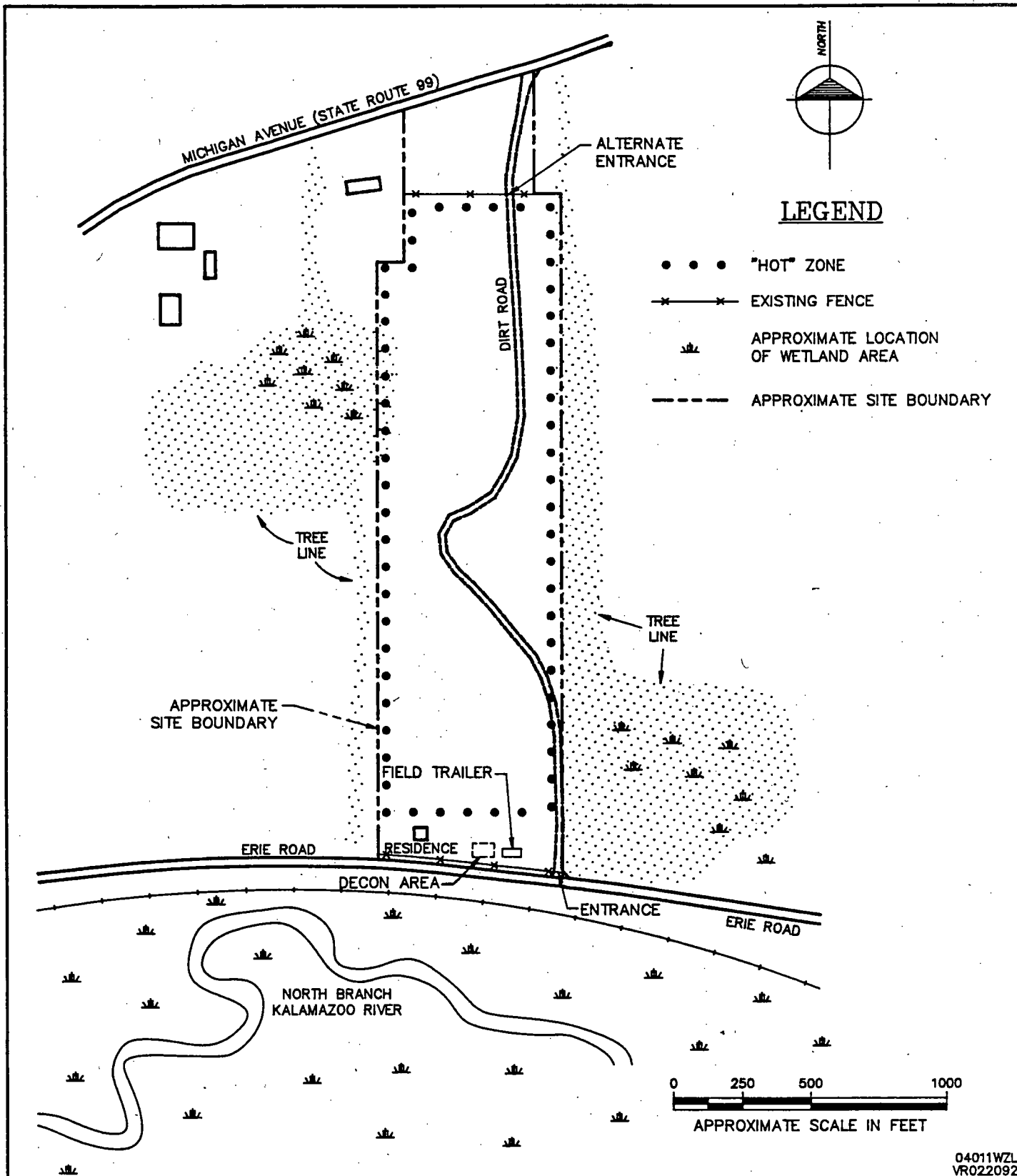


FIGURE 3
**WORK ZONE
LOCATIONS**

ALBION-SHERIDAN TOWNSHIP LANDFILL
ALBION, MICHIGAN

FEBRUARY, 1992

04011

Table 1 Safety and Health Risk Analysis vs Site Task Operation

Job Task/Operation	Potential Health & Safety Hazards																		Anticipated Level of Protection	Air Monitoring
	Inhalation Hazard	Contact w/Contaminated Soils	Noise Hazard	Heat Stress	Electrical	Potential Fire/Explosion	Contact w/ Contaminated Liquids	Cold Stress	Collapsing of Structure on Pers.	Physical Injury	Over Head Power Lines	Buried Tanks	Underground Pipes	Skin Hazard	Ventilation Problem	Spillage of Liquids	Vandalism	Equipment Freezing Problems		
1. Survey Site		X		X			X	X											D	NA
2. Install Security Fence		X		X			X	X											D	NA
3. Conduct geophysical survey		X		X			X	X											D	NA
4. Conduct soil gas survey	X	X					X	X	X										D or C	PID or FID
5. Collect soil samples	X	X		X			X	X	X										D or C	PID or FID
6. Install monitoring wells	X	X	X	X		X	X	X	X	X	X			X					D, C or B	HCN Monitox & PID or FID/CGI
7. Collect ground water samples							X	X	X					X					D	NA
8. Collect subsurface soil samples	X	X	X			X	X	X	X	X				X					D or C	HCN Monitox & PID or FID/CGI
9. Collect residential well samples									X										D	NA
10. Perform aquifer tests							X		X										D	NA
11. Conduct geophysical logging		X					X	X	X					X					D	NA
12. Collect surface soil samples		X							X										D	NA
13. Collect surface water samples							X	X	X										D	NA
14. Collect sediment samples		X					X	X	X					X					D	NA
15. Collect LF cap samples	X	X		X			X	X	X					X					D or C	HCN Monitox &

Table 2 Health Analysis [For additional information refer to MSDS's in Attachment E]

Chemical Name	Exposure Limits	IDLH	Route of Entry	Symptoms	Chemical Properties
Benzene CAS-RN: [71-43-2] C_6H_6	8hr TWA PEL: 1 ppm 15 min STEL: 5 ppm [29 CFR 1910.1028] NIOSH REL: 0.1 ppm NIOSH STEL: 1 ppm Note: Carcinogenic	3,000 ppm [Ca]	Inhalation Ingestion Contact: Skin Eye	Irritation to eyes, nose, respiratory system; headache; dizziness; fatigue; CNS depression. GI disturbances; nausea Irritation, dermatitis Irritation; blurred vision	MW: 78 BP: 176° F Sol: 0.07% FIPt: 12° F IP: 9.24eV VP: 75 mmHg FRZ: 42°F UEL: 7.9% LEL: 1.3% Incompatible with: strong oxidizers, many fluorides & perchlorates, nitric acid. Sp.Gr.: 0.88
Lead CAS-RN [7439-92-1] Pb	8 hr. TWA PEL: 50 µg/m ³ [29 CFR 1910.1025] NIOSH REL: 100 µg/m ³	700 mg/m ³	Inhalation Contact Ingestion	Weakness; lassitude; insomnia; tremors; anemia Constipation; abdominal pain; colic; malnutrition Eye Irritation	MW: 207 BP: 3,164° F Sol: Insoluble FI Pt: NA IP: NA VP: 0mmHg (approx.) MLT: 621° F UEL: NA LEL: NA Sp. Gr. 11.34 (metal) Incompatible with: strong oxidizers, hydrogen peroxide, mineral acids.
Chromic Acid & chromates (hexavalent chromium) CAS-RN: [7738-94-5] H_2CrO_4 [acid]	Ceiling: 100 µg/m ³ NIOSH REL: 1µg/m ³ Note: Carcinogenic	30 mg/m ³ [Ca]	Inhalation Ingestion Contact: Skin	Respiratory system irritation; nasal septum perforation Gastric burning; nausea Skin ulcer; sensitization; dermatitis	Properties vary depending upon the specific compound
Cyanides (as CN) CAS-RN's 1. [151-50-8] 2. [143-33-9] 1. KCN 2. NaCN	8 hr TWA PEL: 5 mg/m ³ NIOSH REL: 10 min. Ceiling 5mg/m ³	50 mg/m ³	Inhalation Ingestion Contact	Asphyxiation and death can occur! weakness; headache; confusion; increased respiratory rate; gasping Nausea; vomiting; death Skin and eye irritation	MW: 65/49 BP's: ?/2725 F Sol's: 72%/58% FIPt's: NA/NA IP's: NA/NA VP's: 0mmHg/0mmHg MLT's: 1173 °F/1047°F UEL's: NA LEL's: NA Sp.Gr.'s: 1.55/1.60 Incompatible with: strong oxidizers, chlorates, nitrates, mineral acids.

ATTACHMENTS

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Attachment A

Site Health and Safety Plan Amendment

SITE SAFETY PLAN AMENDMENT # _____

SITE NAME: _____

DATE: _____

TYPE OF AMENDMENT: _____

REASON FOR AMENDMENT: _____

ALTERNATE SAFEGUARD PROCEDURES: _____

REQUIRED CHANGE IN PPE: _____

(Date) (Safety Officer) (Date)

(Date) (Safety Officer) (Date)

(Date) (Safety Officer) (Date)

Attachment B

Cold Stress

Supervisor's Safety Session

Safety in Winter

Winter brings special health and safety risks, on and off the job. An extra hazard in generally warm areas is unreadiness to cope with sudden cold, ice, and snow.

Cold Stress

Plan cold-weather jobs for the warmest part of the day—and include regular breaks in a warm spot, with an occasional warm drink (no alcohol or caffeine). Limit the time spent in the cold, and advise workers to keep moving. Smoking or bathing just before going out isn't a good idea, and alcohol is an obvious no-no. Hands, feet, face, and head should be covered outdoors. Suggest warm, loose, dry layers of clothing—cotton or wool inside and a waterproof outer layer. Garments that get wet should be exchanged promptly for dry ones.

Skin Problems

Cold and wind, plus dry overheated rooms, make skin dry and chapped. This is uncomfortable and makes the skin more sensitive to other irritants, including chemicals. The best prevention is to cover as much skin as possible outdoors and wear protective clothing indoors on the job. Be sure workers wash thoroughly at the end of a shift and/or when removing protective clothing. It's also a good idea to use skin lotion after washing, and any time skin feels dry or itchy. Suggest adding moisture to the air at home with a humidifier, or even dishes of water on windowsills.

Hypothermia

Extended exposure to cold can drive body temperature dangerously low (hypothermia). Wind, wet clothing, or physical exhaustion can cause hypothermia even when the thermometer is above freezing. It can lead to unconsciousness, occasionally death. At special risk are older people, or those who are overweight, smoke, drink, have poor circulation or allergies, or take various medications. Teach workers that feeling cold, pain in extremities, numbness, shivering, or drowsiness mean it's time to get warm and dry quickly.

Frostbite

Direct exposure to cold or touching a subfreezing object can cause frostbite (frozen body tissue), though victims may be unaware of it. They feel cold, then numb, perhaps with tingling or pain. The skin turns white or grayish yellow, then reddish violet, then black, and may blister. The nose, cheeks, ears, fingers and toes are most vulnerable to frostbite, which can cause permanent tissue damage, with loss of movement in the affected parts—even unconsciousness or death from heart failure. Wrap

a frostbitten part in a sheet or blankets or warm it in warm (not hot) water. Don't rub, apply heat, or drink caffeine. Exercise a warmed body part, but don't walk on frostbitten feet.

On the Road

Since driving is one of winter's greatest hazards, it would not be amiss to repeat some reminders on preparedness (e.g., stocking car with an ice scraper/brush, snow shovel, and sand or other traction material; checking tire pressure, antifreeze, and windshield washer fluid) and extra caution on the road.

Preparing for Winter

A Safety Talk Outline

Prevent Cold Stress

- Limit time in cold and keep moving. Take breaks where it's warm; have warm drinks (no alcohol/caffeine).
- Wear warm, loose, dry layers (cotton or wool inside, waterproof outside); protect hands, feet, face, head; change from wet to dry clothes immediately.
- No smoking, alcohol, bathing right before entering cold.

Skin Protection

- Cover skin outdoors to prevent dryness, chapping.
- Wear protective clothing on job to protect against irritants, and wash thoroughly at end of job
- Use lotions after washing and when skin feels dry/itchy.
- Use humidifier or containers of water to offset dryness at home.

Hypothermia (loss of body heat)

- Worst case: unconsciousness, occasionally death
- Risk conditions: extended exposure to cold, wind, wet clothes, tiring physical activity; (risk increased by age, overweight, poor circulation, smoking, alcohol, allergies, medications).
- Symptoms: cold, pain, shivering, numbness, drowsiness.
- Response: get warm and dry quickly.

Frostbite (frozen body tissues)

- Worst case: tissue damage, loss of body-part movement, possible unconsciousness, death
- Risk conditions: exposure to cold, touching subfreezing object (nose, cheeks, ears, fingers, and toes most vulnerable).
- Symptoms: can include cold, numbness, possible tingling/pain; skin white or gray-yellow, then red-violet, then black; blisters
- Response: gently wrap in sheet or blankets or warm in warm (not hot) water; exercise warmed part (except feet); don't rub, apply heat, or drink caffeine.

Driving Safety

- Keep ice scraper/snow brush, snow shovel, traction material (sand, etc.) in vehicle; clean snow, ice off vehicle before driving.
- Check tire pressure and be sure to have enough antifreeze, windshield washer fluid.
- Reduce speed; stay farther behind other vehicle; watch for ice.

Recognizing, Preventing and Treating Hypothermia

Man is a homoiotherm, a warm-blooded animal who must maintain a constant body heat of 98.6°F (37°C) so that the vital internal organs, particularly the heart and the brain, can perform properly. Workers in meat packing houses, freezer plants and cold storage facilities, outdoor construction workers, dockworkers, divers, firemen, fishermen and persons in like professions run the risk of endangering this delicate temperature balance by overexposure to cold conditions. Every day they face the possible danger of hypothermia.

Hypothermia is the cooling of the body core to a sub-normal temperature caused by exposure to cold, wind and/or rain or by immersion in cold water. Under these conditions, which may easily occur when outside or water temperatures are well above freezing, the body begins to lose its essential heat more rapidly than it is able to

replace it. If such conditions are not soon reversed and the body core temperature is not returned to normal, the body's chemical reactions will be slowed and serious impairment or death may result.

Variables

Hypothermia is usually due to a combination of two or more hazardous conditions. These conditions include the following variables:

Air Temperature: The cooling of the body core can occur at temperatures well above freezing. Caution should therefore be exercised to minimize the potential hazard. Cold exposure limits should be established according to Figure 1.

Water: Water conducts heat away from the body at a rate approximately 25 to 40 times faster than air temperatures. Such a rate applies not only to situations in which persons are totally immersed in water as a result of a dock accident etc., but also to situations in which perspiration, rain and mist are trapped against the body by clothing or footwear. Figure 2 depicts the maximum time limits for survival in cold water.

Wind: The body senses cold as a combination of both temperature and wind. The wind acts to increase the chilling effect of the temperature by blowing away the layer of insulation between the skin and the outside air. Thus, as the temperature falls, the wind has an increasingly greater effect on lowering the body's relative sense of cold. Figure 3 shows this cooling effect.

Clothing: Clothing provides insulation against the effects of cold, wind and rain by minimizing heat loss. It traps a layer of air between the warm body and the outside air, thus keeping in the body heat and keeping out the cold. The effectiveness of clothing is dependent upon the materials used to construct the clothing: for example, denim is loosewoven and easily penetrated by either air or water; duck and goosedown effectively prevent the wind from blowing away the warm air layer but are useless when wet (the insulating properties of cloth are severely reduced when wet); plastic and nylon afford good protection against the wind and the rain but offer little cold insulation. Consequently, the most effective way to dress is in layers of relatively light clothing, the uppermost of which should be waterproof and all of which can be easily donned or removed during the day to keep the body at a comfortable temperature.

Body Type: Survival time may be affected positively or negatively by body type. Body size, body attitude,

Exposure Time Limits		
Exposure Time Limit per 8 hr. Work Period		Remarks
30	no limit	... providing that the worker is properly clothed
20		
10		
0		
-10	4 hours	alternating exposure — 1 hr. in and 1 hr. out of cold area
-20		
-30	two periods of 30 min. each, at least 4 hrs. apart — total exposure — 1 hr.	reports differ: one recommends 15 min. periods with a maximum of 4 per shift; another limits exposure to 1 hr. out of every 4 hrs. with low chill factors, i.e., no wind; a third suggests that continuous operation for 3 hrs. at -33 has been experienced with no lasting or harmful effects
-40		
-50		
-60		
-70	5 minutes	with completely enclosed headgear, heated air respirators and insulated clothing
-80		
-90		
-100		

Figure 1. Exposure time limits.

(Recognizing, Preventing and Treating Hypothermia — continued)

physical condition and amount of subcutaneous fat all contribute to the rate at which the body loses heat. The larger the body, the thicker the layer of insulating fat and the more stress it is able to withstand as a result of physical conditioning, the greater are the chances of survival in cold extremes.

Exposure: Even though the temperature of the hands and the feet can drop as much as 40° to 50° without permanent damage, it is important to keep them well covered because their high rate of heat loss may quickly affect the body core temperature. It is even more crucial to cover the head, because more than half the body's heat may be lost if the head is exposed. The sides of the chest and the groin area also have high heat loss rates, particularly in cold water exposures.

Fuel: If an individual becomes tired during the workday, he or she is more prone to heat loss. Therefore, the body must have a sufficient supply of fuel from which to

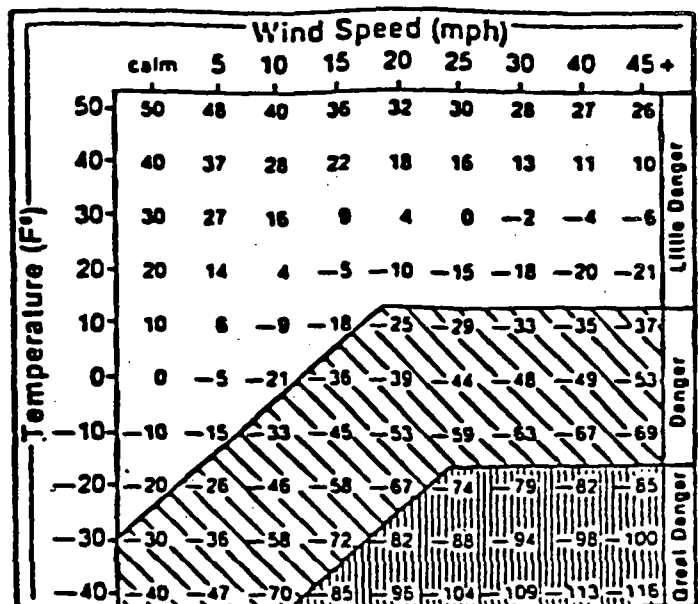


Figure 3. Windchill factor.

draw energy. It is important to eat before going out into the cold and it is also important to carry a food supply (high-energy foods) if there is the possibility of extended cold exposure. Alcohol and drugs, which dilute the blood and numb the senses, lower the body's resistance to cold and consequently increase the risk of hypothermia.

Mental Attitude: Mental attitude plays an important role in any cold stress situation. Imperative to survival is a positive attitude including thought and preparation to prevent hypothermia, an understanding of the warning signs of hypothermia, knowledge of possible hazardous weather conditions and, if faced with an emergency, a clear head, a familiarity with first aid techniques and the will to survive.

Preventative Measures

From the descriptions of the different variables which may contribute to hypothermia, it is easy to determine measures which, when implemented, can significantly reduce its incidence. Such measures include:

- limiting exposure to cold temperatures, rain and wind
- keeping dry
- wearing several layers of clothing or insulated clothing, including a hat
- resting before any possible exposure to insure maximum strength
- eating well to maintain a high fuel level
- carrying extra high-energy foods
- carrying a first aid kit, including blankets
- using a thermal respirator when breathing cold air to prevent freezing the lung tissues
- watching the weather
- thinking clearly
- maintaining a positive attitude in the event of an emergency
- being aware of the signs of hypothermia both in yourself and in others.

Symptoms

When exposed to cold temperature and/or cold water, the body reacts instinctively in a pattern designed to preserve itself. It resorts to involuntary reactions originating in the brain. When the brain recognizes any

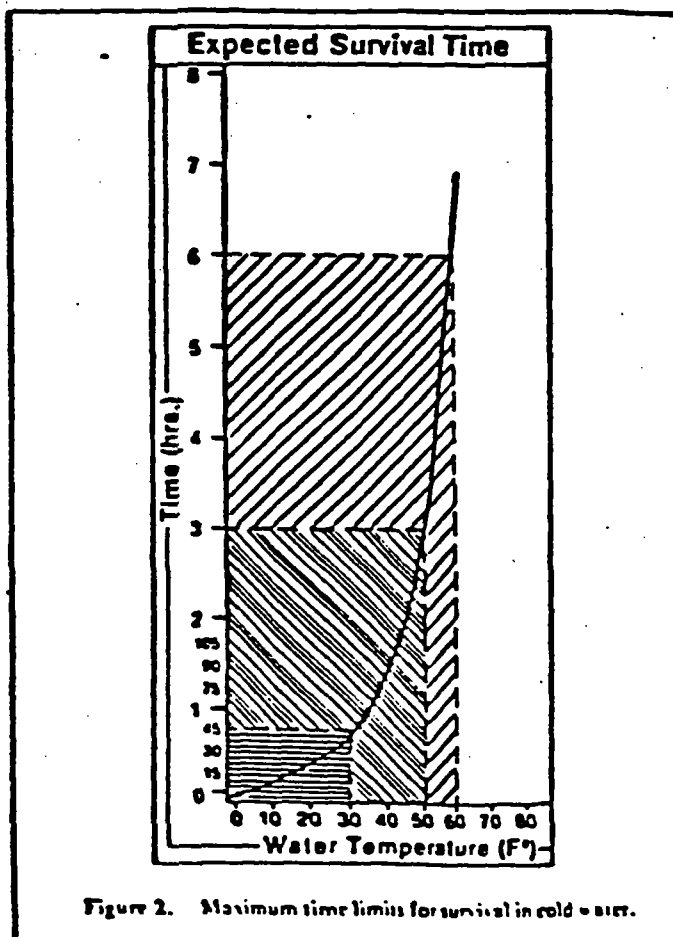


Figure 2. Maximum time limits for survival in cold water.

dangerous temperature drop in the body core, it signals the body to make adjustments to compensate for the imbalance. First, in an attempt to preserve normal temperatures in the vital internal organs, the blood vessels in the extremities constrict (vasoconstriction). This slows the blood flow to the arms and legs, preserving that energy and warm blood for the body core. If there is continued heat loss and if the body core temperature drops below 95°F (35°C), the body then tries to generate more heat through shivering, which causes metabolic heat production to increase to several times the normal rate. This is the first real warning sign of hypothermia. Further heat loss, accompanied by a body core temperature drop to 90°F (32.2°C) or below, results in speech difficulty, loss of manual dexterity, slow reactions, mental confusion and muscle rigidity (muscle hypertonus). If exposure continues further until the body's resources are exhausted and if the cold blood reaches the heart and the brain, heart failure and coma will result and lead inevitably to death. Death occurs when the body core temperature falls below 78°F (25.6°C).

If exposure occurs in temperatures which are below freezing (30°F or below), frostbite or trench foot (immersion foot) may accompany or complicate the symptoms of hypothermia. Frostbite is the freezing of living tissues with a resultant breakdown of cell structure. Injury due to frostbite may range from superficial redness of the skin, slight numbness and blisters, to the obstruction of blood flow (ischemia), blood clots (thrombosis) or skin discoloration due to insufficient oxygen in the blood (cyanosis). Frostbite may occur if the skin comes into contact with objects whose surface temperature is below freezing, such as metal tool handles. Trench foot is caused by continuous exposure to cold combined with persistent dampness or immersion in water. Injuries in this case include permanent tissue damage due to oxygen

deficiency, damage to capillary walls, severe pain, blistering, tissue death and ulceration. Additionally, cold exposures may either induce or intensify vascular abnormalities. These include chilblain (a swelling or sore), Raynaud's disease, acrocyanosis (blueness of hands and feet) and thromboangiitis (inflammation of the innermost walls of blood vessels with accompanying clot formation). Workers suffering from these ailments should take particular precautions to avoid chilling.

Hypothermia damages both the body's internal temperature mechanisms (hypothalamus) and the peripheral mechanisms to prevent heat loss (vasoconstriction and perspiration). These effects may last up to three years.

Treatment

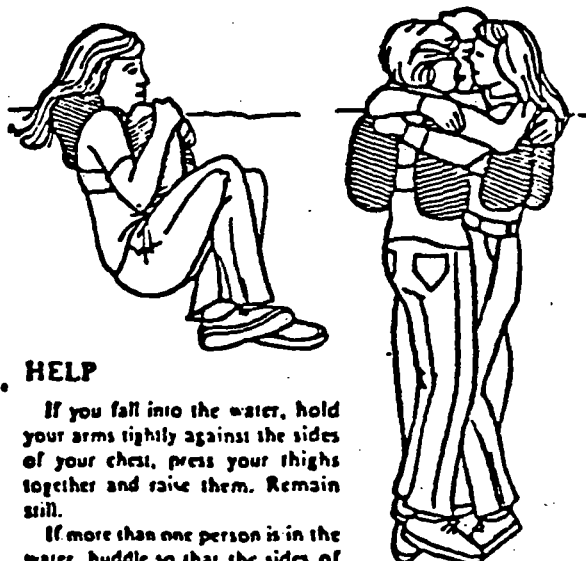
If hypothermia occurs, certain first aid procedures can mean the difference between life and death for the victim. These include the following (as a general rule, treat all injuries in the order of their importance to preserving life):

For Hypothermia:

1. Give artificial respiration and stop any bleeding, if necessary.
2. Bring the victim into a warm room or shelter as quickly as possible.
3. If the victim cannot be moved (spinal injury, etc.) carefully place newspapers, blankets or some other insulation between him and the ground.
4. Remove all wet clothing.
5. Provide an external heat source, for the body cannot generate its own heat. Wrap the victim in prewarmed blankets, place him or her in the liner of a portable hypothermia treatment unit, put the torso (not the extremities) into a tub of warm water or use body-to-body contact to rewarm the body core. These measures will slowly reopen the peripheral circula-

Special Cold Water Survival Techniques

1. Always wear a personal flotation device, not only for its flotation characteristics, but also for the added insulation it will provide in the case of cold water immersion.
2. Do not swim unless it is to a boat or a shore close by. The average swimmer can swim a distance of only 0.85 mile before being incapacitated by hypothermia, while wearing a personal flotation device.
3. Stay in or on a swamped boat.
4. Keep your head above water. Putting your head in the water increases heat loss.
5. Assume the HELP (Heat Escape Lessening Posture) or the Huddle position.
6. Maintain a positive attitude.



HELP

If you fall into the water, hold your arms tightly against the sides of your chest, press your thighs together and raise them. Remain still.

If more than one person is in the water, huddle so that the sides of the chests of different persons are held close together. Remain still.

HUDDLE

9. Do not rub numb skin.
10. Get medical help as soon as possible.

For Frostbite:

1. Wrap the victim in woolen cloth and keep dry until he or she can be brought inside.
2. Do not rub, chafe or manipulate frozen parts.
3. Bring the victim indoors.
4. Place the victim in warm water (102° to 105°F) and make sure it remains warm. Test the water by pouring it on the inner surface of your forearm. Never thaw affected parts if the victim has to go back out into the cold. The affected area may be refrozen.
5. Do not use hot water bottles or a heat lamp, and do not place the victim near a hot stove.
6. Do not allow the victim to walk if his or her feet are affected.
7. Have the victim gently exercise the affected parts once they are thawed.
8. Seek medical aid for thawing of serious frostbite, because the pain will be intense and tissue damage will be extensive.

(Recognizing, Preventing and Treating Hypothermia — continued)

sion so as to minimize the possibility of after-shock or after-drop (the flowing of cooled, stagnated blood from the limbs to the heart), which may cause ventricular fibrillation, cardiac arrest or death.

6. Do not allow the victim to sleep.
7. Give warm, sweet drinks — no alcohol or pain relievers.
8. Keep the victim still. Do not try to walk.

Attachment C

Heat Stress

Heat Stress and Other Physiological Factors

Wearing PPE puts a hazardous waste worker at considerable risk of developing heat stress. This can result in health effects ranging from transient heat fatigue to serious illness or death. Heat stress is caused by a number of interacting factors, including environmental conditions, clothing, workload, and the individual characteristics of the worker. Because heat stress is probably one of the most common (and potentially serious) illnesses at hazardous waste sites, regular monitoring and other preventive precautions are vital.

Individuals vary in their susceptibility to heat stress. Factors that may predispose someone to heat stress include:

- Lack of physical fitness.
- Lack of acclimatization.
- Age.
- Dehydration.
- Obesity.
- Alcohol and drug use.
- Infection.
- Sunburn.
- Diarrhea.
- Chronic disease.

Reduced work tolerance and the increased risk of excessive heat stress is directly influenced by the amount and type of PPE worn. PPE adds weight and bulk, severely reduces the body's access to normal heat exchange mechanisms (evaporation, convection, and radiation), and increases energy expenditure. Therefore, when selecting PPE, each item's benefit should be carefully evaluated in relation to its potential for increasing the risk of heat stress. Once PPE is selected, the safe duration of work/rest periods should be determined based on the:

- Anticipated work rate.
- Ambient temperature and other environmental factors.
- Type of protective ensemble.
- Individual worker characteristics and fitness.

Monitoring

Because the incidence of heat stress depends on a variety of factors, all workers, even those not wearing protective equipment, should be monitored.

- For workers wearing permeable clothing (e.g., standard cotton or synthetic work clothes), follow recommendations for monitoring requirements and suggested work/rest schedules in the current American Conference of Governmental Industrial Hygienists' (ACGIH) Threshold Limit Values for Heat Stress [11]. If the actual clothing worn differs from the ACGIH standard ensemble in insulation value and/or wind and vapor permeability, change the monitoring requirements and work/rest schedules accordingly [12].

- For workers wearing semipermeable or impermeable¹ encapsulating ensembles, the ACGIH standard cannot be used. For these situations, workers should be monitored when the temperature in the work area is above 70°F (21°C) [6].

To monitor the worker, measure:

- Heart rate. Count the radial pulse during a 30-second period as early as possible in the rest period.
If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period the same.
If the heart rate still exceeds 110 beats per minute at the next rest period, shorten the following work cycle by one-third [12].
- Oral temperature. Use a clinical thermometer (3 minutes under the tongue) or similar device to measure the oral temperature at the end of the work period (before drinking).
If oral temperature exceeds 99.6°F (37.6°C), shorten the next work cycle by one-third without changing the rest period.
If oral temperature still exceeds 99.6°F (37.6°C) at the beginning of the next rest period, shorten the following work cycle by one-third [12].
Do *not* permit a worker to wear a semipermeable or impermeable garment when his/her oral temperature exceeds 100.6°F (38.1°C) [12].
- Body water loss, if possible. Measure weight on a scale accurate to ±0.25 lb at the beginning and end of each work day to see if enough fluids are being taken to prevent dehydration. Weights should be taken while the employee wears similar clothing or, ideally, is nude. *The body water loss should not exceed 1.5 percent total body weight loss in a work day* [12].

Initially, the frequency of physiological monitoring depends on the air temperature adjusted for solar radiation and the level of physical work (see Table 8-10). The length of the work cycle will be governed by the frequency of the required physiological monitoring.

Prevention

Proper training and preventive measures will help avert serious illness and loss of work productivity. Preventing heat stress is particularly important because once someone suffers from heat stroke or heat exhaustion, that person may be predisposed to additional heat injuries. To avoid heat stress, management should take the following steps:

- Adjust work schedules:
Modify work/rest schedules according to monitoring requirements.
Mandate work slowdowns as needed.

¹Although no protective ensemble is "completely" impermeable, for practical purposes an outfit may be considered impermeable when calculating heat stress risk.

Rotate personnel: alternate job functions to minimize overstress or overexertion at one task.

Add additional personnel to work teams.

Perform work during cooler hours of the day if possible or at night if adequate lighting can be provided.

- Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods.
- Maintain workers' body fluids at normal levels. This is necessary to ensure that the cardiovascular system functions adequately. Daily fluid intake must approximately equal the amount of water lost in sweat, i.e., 8 fluid ounces (0.23 liters) of water must be ingested for approximately every 8 ounces (0.23 kg) of weight lost. The normal thirst mechanism is not sensitive enough to ensure that enough water will be drunk to replace lost sweat [14]. When heavy sweating occurs, encourage the worker to drink more. The following strategies may be useful:
Maintain water temperature at 50° to 60°F (10° to 15.6°C).
Provide small disposable cups that hold about 4 ounces (0.1 liter).
Have workers drink 16 ounces (0.5 liters) of fluid (preferably water or dilute drinks) before beginning work.
Urge workers to drink a cup or two every 15 to 20 minutes, or at each monitoring break. A total of 1 to 1.6 gallons (4 to 6 liters) of fluid per day are recommended, but more may be necessary to maintain body weight.
Weigh workers before and after work to determine if fluid replacement is adequate.
- Encourage workers to maintain an optimal level of physical fitness:
Where indicated, acclimatize workers to site work conditions: temperature, protective clothing, and workload (see *Level of Acclimatization* at the end of this chapter).
Urge workers to maintain normal weight levels.
- Provide cooling devices to aid natural body heat exchange during prolonged work or severe heat exposure. Cooling devices include:
Field showers or hose-down areas to reduce body temperature and/or to cool off protective clothing.
Cooling jackets, vests, or suits (see Table 8-5 for details).
- Train workers to recognize and treat heat stress. As part of training, identify the signs and symptoms of heat stress (see Table 8-11).

Other Factors

PPE decreases worker performance as compared to an unequipped individual. The magnitude of this effect varies considerably, depending on both the individual and the PPE ensemble used. This section discusses the demonstrated physiological responses to PPE, the individual human characteristics that play a factor in these

Table 8-10. Suggested Frequency of Physiological Monitoring for Fit and Acclimatized Workers^a

ADJUSTED TEMPERATURE ^b	NORMAL WORK ENSEMBLE ^c	IMPERMEABLE ENSEMBLE
90°F (32.2°C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5° - 90°F (30.8° - 32.2°C)	After each 60 minutes of work	After each 30 minutes of work
82.5° - 87.5°F (28.1° - 30.8°C)	After each 90 minutes of work	After each 60 minutes of work
77.5° - 82.5°F (25.3° - 28.1°C)	After each 120 minutes of work	After each 90 minutes of work
72.5° - 77.5°F (22.5° - 25.3°C)	After each 150 minutes of work	After each 120 minutes of work

Source: Reference [13].

^aFor work levels of 250 kilocalories/hour.

^bCalculate the adjusted air temperature ($t_{a\text{adj}}$) by using this equation: $t_{a\text{adj}}^{\circ}\text{F} = t_a^{\circ}\text{F} + (13 \times \% \text{ sunshine})$. Measure air temperature (t_a) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow. (100 percent sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows.)

^cA normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.

Table 8-11. Signs and Symptoms of Heat Stress^a

- Heat rash may result from continuous exposure to heat or humid air.
- Heat cramps are caused by heavy sweating with inadequate electrolyte replacement. Signs and symptoms include:
 - muscle spasms
 - pain in the hands, feet, and abdomen
- Heat exhaustion occurs from increased stress on various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include:
 - pale, cool, moist skin
 - heavy sweating
 - dizziness
 - nausea
 - fainting
- Heat stroke is the most serious form of heat stress. Temperature regulation fails and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury and death occur. Competent medical help must be obtained. Signs and symptoms are:
 - red, hot, usually dry skin
 - lack of or reduced perspiration
 - nausea
 - dizziness and confusion
 - strong, rapid pulse
 - coma

^aSource: Reference [6].

responses, and some of the precautionary and training measures that need to be taken to avoid PPE-induced injury.

The physiological factors may affect worker ability to function using PPE include:

- Physical condition.
- Level of acclimatization.
- Age.
- Gender.
- Weight.

Physical Condition

Physical fitness is a major factor influencing a person's ability to perform work under heat stress. The more fit someone is, the more work they can safely perform. At a given level of work, a fit person, relative to an unfit person, will have [5,8,15,16]:

- Less physiological strain.
- A lower heart rate.
- A lower body temperature, which indicates less retained body heat (a rise in internal temperature precipitates heat injury).
- A more efficient sweating mechanism.
- Slightly lower oxygen consumption.
- Slightly lower carbon dioxide production.

Level of Acclimatization

The degree to which a worker's body has physiologically adjusted or acclimatized to working under hot conditions affects his or her ability to do work. Acclimatized individuals generally have lower heart rates and body temperatures than unacclimatized individuals [17], and sweat sooner and more profusely. This enables them to maintain lower skin and body temperatures at a given level of environmental heat and work loads than unacclimatized workers [18]. Sweat composition also becomes more dilute with acclimatization, which reduces salt loss [8].

Acclimatization can occur after just a few days of exposure to a hot environment [15,16]. NIOSH recommends a progressive 6-day acclimatization period for the unacclimatized worker before allowing him/her to do full work on a hot job [16]. Under this regimen, the first day of work on site is begun using only 50 percent of the anticipated workload and exposure time, and 10 percent is added each day through day 6 [16]. With fit or trained individuals, the acclimatization period may be shortened 2 or 3 days. However, workers can lose acclimatization in a matter of days, and work regimens should be adjusted to account for this.

When enclosed in an impermeable suit, fit acclimatized individuals sweat more profusely than unfit or unacclimatized individuals and may therefore actually face a greater danger of heat exhaustion due to rapid dehydration. This can be prevented by consuming adequate quantities of water. See previous section on *Prevention* for additional information.

Age

Generally, maximum work capacity declines with increasing age, but this is not always the case. Active, well-conditioned seniors often have performance capabilities equal to or greater than young sedentary individuals. However, there is some evidence, indicated by lower sweat rates and higher body core temperatures, that older individuals are less effective in compensating for a given level of environmental heat and work loads [19]. At moderate thermal loads, however, the physiological responses of "young" and "old" are similar and performance is not affected [19].

Age should not be the sole criterion for judging whether or not an individual should be subjected to moderate heat stress. Fitness level is a more important factor.

Gender

The literature indicates that females tolerate heat stress at least as well as their male counterparts [20]. Generally, a female's work capacity averages 10 to 30 percent less than that of a male [8]. The primary reasons for this are the greater oxygen-carrying capacity and the stronger heart in the male [15]. However, a similar situation exists as with aging: not all males have greater work capacities than all females.

Weight

The ability of a body to dissipate heat depends on the ratio of its surface area to its mass (surface area/weight). Heat loss (dissipation) is a function of surface area and heat production is dependent on mass. Therefore, heat balance is described by the ratio of the two.

Since overweight individuals (those with a low ratio) produce more heat per unit of surface area than thin individuals (those with a high ratio), overweight individuals should be given special consideration in heat stress situations. However, when wearing impermeable clothing, the weight of an individual is not a critical factor in determining the ability to dissipate excess heat.

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Attachment D

Confined Space Entry Procedures

CONFINED SPACE ENTRY PROCEDURES

I. PURPOSE

To establish requirements for safe entry into, continued work in, and safe exit from confined spaces.

II. DEFINITIONS

- A. Confined Space: A space or work area not designed or intended for normal human occupancy, having limited means of egress and poor natural ventilation; and/or any structure, including buildings or rooms, which have limited means of egress.
- B. Confined Space Entry Permit: A document to be initiated by the supervisor of personnel who are to enter into or work in a confined space. The Confined Space Entry Permit (CSEP) will be completed by the designated Field Team Leader or Supervisor before personnel will be permitted to enter the confined space. The CSEP shall be valid only for the performance of the work identified and for the location and time specified. The beginning of a new shift with change of personnel will require the issuance of a new CSEP. A copy of the CSEP is attached for reference purposes.
- C. Confined Space Observer: An individual assigned to monitor the activities of personnel working within a confined space. The confined space observer monitors and provides external assistance to those inside the confined space. The confined space observer summons rescue personnel in the event of emergency and assists the rescue team.

III. GENERAL

- A. The Field Team Leader, with the concurrence of the Site Safety Officer (SSO), has the responsibility to issue and distribute the CSEP (see IV.J), to evaluate and monitor work performed within a confined space for possible hazards, and to determine the safety procedures, PPE, and rescue equipment required for standby.
- B. When possible, confined spaces should be identified with a posted sign which reads: "Caution - Confined Space."

- C. Only personnel trained and knowledgeable of the requirements of these Confined Space Entry Procedures will be authorized to enter a confined space or be a confined space observer.
- D. A CSEP must be issued prior to the performance of any work within a confined space. The CSEP will become a part of the permanent and official record of the site.
- E. Continuous monitoring of LEL and O₂ levels must be conducted during confined space entry with equipment that gives audible alarms.
- F. Ventilation shall be provided for the confined space prior to initial entry and for the duration of the CSEP. Positive/forced mechanical ventilation may be required. However, care should be taken not to spread contamination outside of the enclosed area.
- G. Where air-moving equipment is used to provide ventilation, chemicals shall be removed from the vicinity to prevent introduction into the confined space.
- H. Vehicles shall not be left running near confined space work or near air-moving equipment being used for confined space ventilation.
- I. Smoking in confined spaces will be prohibited at all times.
- J. If flammable liquids may be contained within the confined space, explosion-proof equipment will be used. All equipment shall be positively grounded.
- K. The contents of any confined space shall, where necessary, be removed prior to the work. All sources of ignition must be eliminated prior to the work.
- L. Hand tools used in confined spaces shall be in good repair, explosion-proof, and spark-proof, and selected according to intended use. Where possible, pneumatic power tools are to be used instead of electrically-energized tools.
- M. Hand-held lights and other illumination utilized in confined spaces shall be equipped with guards to prevent contact with the bulb and must be explosion-proof.
- N. Compressed gas cylinders, except compressed air cylinders used for self-contained breathing apparatus, shall not be taken into confined spaces.

Supplied air hoses shall be removed from the space and the supply turned off at the cylinder valve when personnel exit from the confined space.

- O. Only self-contained breathing apparatus or NIOSH approved airline respirators equipped with a 5-minute emergency air supply (egress bottle) shall be used in untested confined spaces or in any confined space with conditions determined immediately dangerous to life and health.
- P. A ladder is required in all confined spaces deeper than the employee's shoulders. The ladder shall be secured and not removed until all employees have exited the space.
- Q. Any deviation from these Confined Space Entry Procedures requires the prior permission of the SSO.

IV. PROCEDURE FOR CONFINED SPACE ENTRY PERMITS (CSEP)

The Field Team Leader shall:

- A. Evaluate the job to be done and identify the potential hazards before a job in a confined space is scheduled.
- B. Ensure that all process piping, mechanical and electrical equipment, etc., have been disconnected, purged, blanked-off or locked and tagged as necessary.
- C. If possible, ensure removal of any standing fluids that may produce toxic or air displacing gases, vapors, or dust.
- D. Initiate a CSEP in concurrence with the SSO.
- E. Ensure that any hot work (welding, burning, open flames, or spark producing operation) that is to be performed in the confined space has been approved by the SSO and is indicated on the CSEP.
- F. Ensure that the space is ventilated before starting work in the confined space and for the duration of the time that the work is to be performed in the space.
- G. Ensure that the personnel who enter the confined space and the confined space observer helper (see V.F) are familiar with the contents and requirements of the SCEP.

- H. Ensure remote atmospheric testing of the confined space prior to employee entry and before validation/revalidation of a CSEP to ensure the following:
1. Oxygen content between 19.5% - 23.5%. Combustible atmosphere readings <10% of LEL.
 2. No concentration of combustible gas in the space. Sampling will be done throughout the confined space and specifically at the highest and lowest points in the space.
 3. The absence of other atmospheric contaminants, if the space has contained toxic, corrosive, or irritant material.
 4. If remote testing is not possible, a minimum of Level B PPE is required.
- I. Designate whether hot or cold work will be allowed.
- J. Ensure that a copy of the CSEP is posted at the work site, a copy is filed with the project manager, and a copy is furnished to the SSO.

The CSEP posted at the work site shall be removed at the completion of the job or the end of the shift, whichever is first. The date and time shall be recorded on the form and the form filed with the SSO.

V. CONFINED SPACE OBSERVER

- A. While personnel are inside the confined space, a confined space observer will monitor the activities and provide external assistance to those in the space. The observer will have no other duties which may take his attention away from the work or require him to leave the vicinity of the confined space at any time while personnel are in the space.
- B. The confined space observer shall maintain at least voice contact with all personnel in the confined space. Visual contact is preferred, if possible.
- C. The observer shall be instructed by his supervisor in the method for contacting rescue personnel in the event of an emergency.
- D. If irregularities within the space are detected by the observer, personnel within the space will be ordered to exit.
- E. In the event of an emergency, the observer must NEVER enter the confined space prior to contacting and receiving assistance from a helper.

Prior to this time, he should attempt to remove personnel with the lifeline and to perform all other rescue functions from outside the space.

- F. A helper shall be designated to provide assistance to the confined space observer in case the observer must enter the confined space to retrieve personnel.

CONFINED SPACE ENTRY PERMIT

DATE: _____ TIME ISSUED: _____ LOCATION: _____

PERMIT EXPIRES: _____ TASK TO BE PERFORMED: _____

HAZARDS AND SOPS ASSOCIATED WITH THIS TASK:

REQUIRED AIR MONITORING (Record Readings in Log Book):

Yes/No	Type	Frequency
_____	Oxygen	_____
_____	Combustible Gas	_____
_____	Organics	_____
_____	Other	_____

NAME OF PERSON CONDUCTING AIR MONITORING: _____

SAFETY PRECAUTIONS REQUIRED ☒ /IMPLEMENTED (X):

___ Standby Observer	()	___ Rescue Equipment	()
___ Confined Space Cleaned	()	___ Lifelines/Harness	()
of Hazardous Materials	()	___ Electrical Power	()
___ Confined Space Ventilated	()	Disconnected	
___ Continuous Monitoring	()	___ Special Lighting	()
___ Spark-Proof Equipment/Tools	()	___ Equipment Lockout	
___ Hot Work Permit	()	(itemize)	
		_____	()
		_____	()
		_____	()

PROTECTIVE EQUIPMENT:

Level A _____	Additional Equipment _____
Level B _____	Additional Equipment _____
Level C _____	Additional Equipment _____

ENTRY AND EMERGENCY PROCEDURES UNDERSTOOD (Signatures)

Entry Personnel: _____

Confined Space Observer: _____

Designated Helper(s): _____

AUTHORIZATIONS:

Field Team Leader: _____

Site Safety Officer: _____

OPTIONAL ATTACHMENT

ADDITIONAL COMMENTS/REQUIREMENTS:

NAMES OF PERSONS INVOLVED: _____

AGENCY SUPERVISOR SIGNATURE: _____

TIME: _____ DATE: _____

AGENCY MANAGER SIGNATURE: _____

TIME: _____ DATE: _____

SUMMARIZE CONFINED SPACE ACTIVITIES UPON COMPLETION:

AGENCY SUPERVISOR SIGNATURE: _____

TIME: _____ DATE: _____

AGENCY MANAGER SIGNATURE: _____

TIME: _____ DATE: _____

Attachment E

Material Safety Data Sheets (MSDS's)

1 - Site Specific Information

No SITE SPECIFIC INFORMATION has been entered for this chemical

2 - PRODUCT IDENTIFICATION

PRODUCT NAME: BENZENE
COMMON SYNONYMS: BENZOL; PHENYL HYDRIDE; COAL NAPHTHA
CHEMICAL FAMILY: AROMATIC HYDROCARBONS
FORMULA: C₆H₆
FORMULA WT.: 78.10
CAS NO.: 71-43-2
NIOSH/RTCS NO.: C1140000
PRODUCT USE: LABORATORY REAGENT
PRODUCT CODES: B717, 9153, 9154, 9149, 9153, 9156, 9256

CHEMTREC # (800) 424-9300
NATIONAL RESPONSE CENTER # (800) 424-8802
J.T. BAKER INC.
222 RED SCHOOL LANE
PHILIPSBURG, NJ 08865
24-HOUR EMERGENCY TELEPHONE --- (201) 859-2151
EFFECTIVE: 05/01/89 ISSUED: 12/08/90
REVISION #06

PRECAUTIONARY LABELING

BAKER SAF-T-DATA* SYSTEM

HEALTH	4	-	EXTREME (CANCER CAUSING)
FLAMMABILITY	3	-	SEVERE (FLAMMABLE)
REACTIVITY	2	-	MODERATE
CONTACT	1	-	SLIGHT

LABORATORY PROTECTIVE EQUIPMENT

GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER

U.S. PRECAUTIONARY LABELING

POISON DANGER

EXTREMELY FLAMMABLE. CAUTION: CONTAINS BENZENE. CANCER HAZARD. HARMFUL IF

2 - PRODUCT IDENTIFICATION (continued)

SWALLOWED, INHALED, OR ABSORBED THROUGH SKIN. EXCEPTIONAL HEALTH HAZARD: READ MATERIAL SAFETY DATA SHEET.
KEEP AWAY FROM HEAT, SPARKS, FLAME. DO NOT GET IN EYES, ON SKIN, ON CLOTHING.
DO NOT BREATHE VAPOR. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING. KEEP CONTAINERS OUT OF SUN AND AWAY FROM HEAT. IN CASE OF FIRE, USE ALCOHOL FOAM, DRY CHEMICAL, CARBON DIOXIDE - WATER MAY BE INEFFECTIVE. IN CASE OF SPILL, SOAK UP WITH SAND OR EARTH.

PRECAUTIONARY LABELING (CONTINUED)

INTERNATIONAL LABELING

HIGHLY FLAMMABLE. TOXIC BY INHALATION AND IN CONTACT WITH SKIN. MAY CAUSE

CANCER.

KEEP CONTAINER IN A WELL-VENTILATED PLACE. KEEP AWAY FROM SOURCES OF IGNITION - NO SMOKING. DO NOT EMPTY INTO DRAINS. AVOID EXPOSURE - OBTAIN SPECIAL INSTRUCTIONS BEFORE USE.

SAF-T-DATA* STORAGE COLOR CODE: RED STRIPE (STORE SEPARATELY)

3 - COMPONENTS

COMPONENT	CAS NO.	WEIGHT %	OSHA/PEL	ACGIH/TLV
BENZENE	71-43-2	99-100	1 PPM	10 PPM

4 - PHYSICAL DATA

BOILING POINT: 80 C (176 F)	(AT 760 MM HG)
MELTING POINT: 6 C (42 F)	(AT 760 MM HG)
SPECIFIC GRAVITY: 0.88	(H2O=1)
SOLUBILITY(H2O): NEGLIGIBLE (<0.1%)	(21 C)
% VOLATILES BY VOLUME: 100	
EVAPORATION RATE: N/A	
VAPOR PRESSURE (MMHG): 74.6	(20 C)
VAPOR DENSITY (AIR=1): 2.77	

4 - PHYSICAL DATA (continued)

FH: N/A

ODOR THRESHOLD (P.P.M.): N/A

PHYSICAL STATE: LIQUID

COEFFICIENT WATER/OIL DISTRIBUTION: N/A

APPEARANCE & ODOR: CLEAR, COLORLESS LIQUID, AROMATIC ODOR.

5 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP): -11 C (12 F) NFPA 704M RATING: 2-3-0

AUTOIGNITION TEMPERATURE: 497 C (928 F)

FLAMMABLE LIMITS: UPPER - 8.0 % LOWER - 1.3 %

FIRE EXTINGUISHING MEDIA

USE ALCOHOL FOAM, DRY CHEMICAL OR CARBON DIOXIDE. (WATER MAY BE INEFFECTIVE.)

SPECIAL FIRE-FIGHTING PROCEDURES

FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED

BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE

MODE. MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE

WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

UNUSUAL FIRE & EXPLOSION HAZARDS

VAPORS MAY FLOW ALONG SURFACES TO DISTANT IGNITION SOURCES AND FLASH BACK. CLOSED CONTAINERS EXPOSED TO HEAT MAY EXPLODE. CONTACT WITH STRONG

OXIDIZERS MAY CAUSE FIRE.

TOXIC GASES PRODUCED

CARBON MONOXIDE, CARBON DIOXIDE

EXPLOSION DATA-SENSITIVITY TO MECHANICAL IMPACT

NONE IDENTIFIED.

EXPLOSION DATA-SENSITIVITY TO STATIC DISCHARGE

NONE IDENTIFIED.

6 - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE (TLV/TWA): 30 MG/M3 (10 PPM)

SHORT-TERM EXPOSURE LIMIT (STEL): NOT ESTABLISHED

PERMISSIBLE EXPOSURE LIMIT (PEL): 3 MG/M3 (1 PPM)

PEL (CEILING) = 25 PPM

TOXICITY OF COMPONENTS

ORAL RAT LD50 FOR BENZENE
ORAL MOUSE LD50 FOR BENZENE
INTRAPERITONEAL RAT LD50 FOR BENZENE
INHALATION MOUSE LC50 FOR BENZENE
CARCINOGENICITY: NTP: YES IARC: YES Z LIST: NO OSHA REG: NO
4894 MG/KG
4700 MG/KG
2.89 MG/KG
9980 PPM

CARCINOGENICITY

THIS SUBSTANCE IS LISTED AS AN ACGIH SUSPECTED HUMAN CARCINOGEN, A NTP
HUMAN CARCINOGEN, AND AN IARC HUMAN CARCINOGEN (GROUP 1)

REPRODUCTIVE EFFECTS

NONE IDENTIFIED

EFFECTS OF OVEREXPOSURE

INHALATION: HEADACHE, NAUSEA, VOMITING, DIZZINESS, NARCOSIS,
RESPIRATORY FAILURE, LOW BLOOD PRESSURE, CENTRAL NERVOUS
SYSTEM DEPRESSION, SEVERE IRRITATION OR BURNS OF
RESPIRATORY SYSTEM, PULMONARY EDEMA, LUNG INFLAMMATION
SKIN CONTACT: IRRITATION, PROLONGED CONTACT MAY CAUSE DERMATITIS
EYE CONTACT: IRRITATION, MAY CAUSE TEMPORARY CORNEAL DAMAGE
SKIN ABSORPTION: NONE IDENTIFIED
INGESTION: HEADACHE, NAUSEA, VOMITING, DIZZINESS, GASTROINTESTINAL
IRRITATION, BLURRED VISION, LOW BLOOD PRESSURE
CHRONIC EFFECTS: DAMAGE TO BLOOD FORMING TISSUE

TARGET ORGANS

BLOOD, CENTRAL NERVOUS SYSTEM, EYES, SKIN, BONE MARROW, RESPIRATORY
SYSTEM, LUNGS

6 - HEALTH HAZARD DATA (continued)

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
NONE IDENTIFIED

PRIMARY ROUTES OF ENTRY

INGESTION, INHALATION, EYE CONTACT, SKIN CONTACT, ABSORPTION

EMERGENCY AND FIRST AID PROCEDURES

INGESTION: CALL A PHYSICIAN. IF SWALLOWED, DO NOT INDUCE VOMITING.

INHALATION: IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE
ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE
OXYGEN.

SKIN CONTACT: IN CASE OF CONTACT, IMMEDIATELY FLUSH SKIN WITH PLENTY OF
WATER FOR AT LEAST 15 MINUTES.

EYE CONTACT: IN CASE OF EYE CONTACT, IMMEDIATELY FLUSH WITH PLENTY OF
WATER FOR AT LEAST 15 MINUTES.

SARA/TITLE III HAZARD CATEGORIES AND LISTS

ACUTE: YES CHRONIC: YES FLAMMABILITY: YES PRESSURE: NO REACTIVITY: NO

EXTREMELY HAZARDOUS SUBSTANCE: NO

CECRLA HAZARDOUS SUBSTANCE: YES

CONTAINS BENZENE (RQ = 1000 LBS)

SARA 313 TOXIC CHEMICALS: YES

CONTAINS BENZENE

GENERIC CLASS:

CO1

TSCA INVENTORY: YES

THIS PRODUCT IS A CHEMICAL KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.
THAT WE PROVIDE TO USERS AND THEIR EMPLOYEES THE FOLLOWING MESSAGE: WARNING:
STATE LISTS: FOR PRODUCTS SOLD IN THE STATE OF CALIFORNIA, THE STATE REQUIRES

7 - REACTIVITY DATA

STABILITY: STABLE

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID:

HEAT, FLAME, OTHER SOURCES OF IGNITION

INCOMPATIBLES:

STRONG OXIDIZING AGENTS, SULFURIC ACID, NITRIC ACID

J.T.BAKER MSDS
MSDS for BENZENE

7 - REACTIVITY DATA (continued)

DECOMPOSITION PRODUCTS: CARBON MONOXIDE, CARBON DIOXIDE

8 - SPILL & DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE

WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING. SHUT OFF IGNITION SOURCES; NO FLARES, SMOKING OR FLAMES IN AREA. STOP LEAK IF YOU CAN DO SO WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. TAKE UP WITH SAND OR OTHER NON-COMBUSTIBLE ABSORBENT MATERIAL AND PLACE INTO CONTAINER FOR LATER DISPOSAL. FLUSH AREA WITH WATER.

J. T. BAKER SOLUSORB(R) SOLVENT ADSORBENT IS RECOMMENDED FOR SPILLS OF THIS PRODUCT.

DISPOSAL PROCEDURE

DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: U019 (TOXIC WASTE)

9 - INDUSTRIAL PROTECTIVE EQUIPMENT

VENTILATION: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.

RESPIRATORY PROTECTION: RESPIRATORY PROTECTION REQUIRED IF AIRBORNE CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS ABOVE 10 PPM, A SELF-CONTAINED BREATHING APPARATUS IS ADVISED.

EYE/SKIN PROTECTION: SAFETY GOGGLES AND FACE SHIELD, UNIFORM, PROTECTIVE SUIT, POLYVINYL ALCOHOL GLOVES ARE RECOMMENDED.

10 - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA* STORAGE COLOR CODE: RED STRIPE (STORE SEPARATELY)

STORAGE REQUIREMENTS

KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL, DRY, WELL-VENTILATED, FLAMMABLE LIQUID STORAGE AREA.

J.T.BAKER MSDS
MSDS for BENZENE

10 - STORAGE AND HANDLING PRECAUTIONS (continued)

SPECIAL PRECAUTIONS

BOND AND GROUND CONTAINERS WHEN TRANSFERRING LIQUID.

11 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME: BENZENE (BENZOL)
HAZARD CLASS: FLAMMABLE LIQUID
UN/NA: UN1114 REPORTABLE QUANTITY: 1000 LBS.
LABELS: FLAMMABLE LIQUID
REGULATORY REFERENCES: 49CFR 172.101; 173.119

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME: BENZENE
HAZARD CLASS: 3.2 I.M.O. PAGE: 3058
UN: UN1114 MARINE POLLUTANTS: NO PACKAGING GROUP: II
LABELS: FLAMMABLE LIQUID
REGULATORY REFERENCES: 49CFR 172.102; PART 176; IMO

AIR (I.C.A.O.)

PROPER SHIPPING NAME: BENZENE
HAZARD CLASS: 3.2
UN: UN1114 PACKAGING GROUP: II
LABELS: FLAMMABLE LIQUID
REGULATORY REFERENCES: 49CFR 172.101; 173.6; PART 175; ICAO/IATA

U.S. CUSTOMS HARMONIZATION NUMBER: 29022000001

N/A = NOT APPLICABLE OR NOT AVAILABLE
N/E = NOT ESTABLISHED

THE INFORMATION IN THIS MATERIAL SAFETY DATA SHEET MEETS THE REQUIREMENTS OF THE UNITED STATES OCCUPATIONAL SAFETY AND HEALTH ACT AND REGULATIONS PROMULGATED THEREUNDER (29 CFR 1910.1200 ET. SEQ.) AND THE CANADIAN WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM. THIS DOCUMENT IS INTENDED ONLY AS A GUIDE TO THE APPROPRIATE PRECAUTIONARY HANDLING OF THE MATERIAL BY A PERSON TRAINED IN, OR SUPERVISED BY A PERSON TRAINED IN, CHEMICAL HANDLING. THE USER IS RESPONSIBLE FOR DETERMINING THE PRECAUTIONS AND DANGERS OF THIS CHEMICAL.

J.T.BAKER MSDS
MSDS for BENZENE

11 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION (continued)

FOR HIS OR HER PARTICULAR APPLICATION. DEPENDING ON USAGE, PROTECTIVE CLOTHING INCLUDING EYE AND FACE GUARDS AND RESPIRATORS MUST BE USED TO AVOID CONTACT WITH MATERIAL OR BREATHING CHEMICAL VAPORS/FUMES.

EXPOSURE TO THIS PRODUCT MAY HAVE SERIOUS ADVERSE HEALTH EFFECTS. THIS CHEMICAL MAY INTERACT WITH OTHER SUBSTANCES. SINCE THE POTENTIAL USES ARE SO VARIED, BAKER CANNOT WARN OF ALL OF THE POTENTIAL DANGERS OF USE OR INTERACTION WITH OTHER CHEMICALS OR MATERIALS. BAKER WARRANTS THAT THE CHEMICAL MEETS THE SPECIFICATIONS SET FORTH ON THE LABEL.

BAKER DISCLAIMS ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, WITH REGARD TO THE PRODUCT SUPPLIED HEREUNDER, ITS MERCHANTABILITY OR ITS FITNESS FOR A PARTICULAR PURPOSE.

THE USER SHOULD RECOGNIZE THAT THIS PRODUCT CAN CAUSE SEVERE INJURY AND EVEN DEATH, ESPECIALLY IF IMPROPERLY HANDLED OR THE KNOWN DANGERS OF USE ARE NOT HEEDED. READ ALL PRECAUTIONARY INFORMATION. AS NEW DOCUMENTED GENERAL SAFETY INFORMATION BECOMES AVAILABLE, BAKER WILL PERIODICALLY REVISE THIS MATERIAL SAFETY DATA SHEET. IF YOU HAVE ANY QUESTIONS, PLEASE CALL CUSTOMER SERVICE (1-800-JTBAKER) FOR ASSISTANCE.

COPYRIGHT 1990 J.T.BAKER INC.
* TRADEMARKS OF J.T.BAKER INC.

APPROVED BY QUALITY ASSURANCE DEPARTMENT.

**J. T. Baker Chemical Co.**222 Red School Lane Phillipsburg, N.J. 08865
24-Hour Emergency Telephone -- (201) 859-2151Chemtrec # (800) 424-9300
National Response Center # (800) 424-8802**MATERIAL
SAFETY DATA
SHEET**

L2352 -01

Lead, 1000 ppm (0.100% w/v)

Page: 1

Effective: 11/20/85

Issued: 11/20/85

SECTION I - PRODUCT IDENTIFICATION

Product Name: Lead, 1000 ppm (0.100% w/v)

Formula: Pb_3O_4 in HNO_3

Formula Wt: 207.20

CAS No.: 00000-00-0

Product Codes: 6930

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA™ System

HEALTH

2

MODERATE

FLAMMABILITY

0

NONE

REACTIVITY

1

SLIGHT

CONTACT

3

SEVERE

Laboratory Protective Equipment

GOGGLES
& SHIELDLAB COAT
& APRONVENT
HOODPROPER
GLOVES

Precautionary Label Statements

DANGER!

CAUSES BURNS

HARMFUL IF SWALLOWED

Do not get in eyes, on skin, on clothing.

Avoid breathing vapor. Keep in tightly closed container. Use with adequate ventilation. Wash thoroughly after handling.

SECTION II - HAZARDOUS COMPONENTS

Component	%	CAS No.
Lead Oxide	0-1	1314-41-6
Nitric Acid	1-2	7697-37-2

SECTION III - PHYSICAL DATA

Boiling Point:	100°C (212°F)	Vapor Pressure(mmHg):	N/A
Melting Point:	0°C (32°F)	Vapor Density(air=1):	N/A

Continued on Page: 2

SECTION III - PHYSICAL DATA (Continued)

Specific Gravity: 1.00
(H₂O=1)

Evaporation Rate: N/A
(Butyl Acetate=1)

Solubility(H₂O): Complete (in all proportions) % Volatiles by Volume: N/A

Appearance & Odor: Clear, colorless solution.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point: N/A NFPA 704M Rating: 3-0-0

Fire Extinguishing Media

Use extinguishing media appropriate for surrounding fire.

Special Fire-Fighting Procedures

Firefighters should wear proper protective equipment and self-contained breathing apparatus with full facepiece operated in positive pressure mode.

Toxic Gases Produced

nitrogen oxides

SECTION V - HEALTH HAZARD DATA

Threshold Limit Value (TLV/TWA): 0.15 mg/m³ (ppm)

Toxicity: LD₅₀ (ipr-rat)(mg/kg) - 630

Effects of Overexposure

Liquid may cause burns to skin and eyes.
Vapors may be irritating to eyes, nose and throat.
Inhalation of vapors may cause coughing and difficult breathing.
Chronic effects resulting from low level exposure to lead compounds may include anemia, kidney damage, impaired eyesight, and lead build-up in the central nervous system (particularly the brain).

Emergency and First Aid Procedures

CALL A PHYSICIAN.

If swallowed, do NOT induce vomiting; if conscious, give water, milk, or milk of magnesia.

In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.

Wash clothing before re-use.

Toxicity test results are listed for the solute.

Continued on Page: 3



J. T. Baker Chemical Co.

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MATERIAL SAFETY DATA SHEET

L2352 -01
Effective: 11/20/85

Lead, 1000 ppm (0.100% w/v)

Page: 3
Issued: 11/20/85

SECTION VI - REACTIVITY DATA

Stability: Stable Hazardous Polymerization: Will not occur

Conditions to Avoid: none documented

Incompatibles: strong reducing agents

Decomposition Products: oxides of nitrogen

SECTION VII - SPILL AND DISPOSAL PROCEDURES

Steps to be taken in the event of a spill or discharge

Wear self-contained breathing apparatus and full protective clothing.
Stop leak if you can do so without risk. Use water spray to reduce vapors.
Take up with sand or other non-combustible absorbent material and place
into container for later disposal. Flush spill area with water.

Disposal Procedure

Dispose in accordance with all applicable federal, state, and local
environmental regulations.

EPA Hazardous Waste Number: D002 (Corrosive Waste)

SECTION VIII - INDUSTRIAL PROTECTIVE EQUIPMENT

Eye/Skin Protection: This is a laboratory-use product for which no
industrial protective equipment has been
designated.

SECTION IX - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATATM Storage Color Code: White

Special Precautions

Keep container tightly closed. Store in corrosion-proof area.

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

Proper Shipping Name	Nitric acid, 40% or less solution
Hazard Class	Corrosive material (liquid)
UN/NA	NA1760
Labels	CORROSIVE
Reportable Quantity	1000 LBS.

Continued on Page: 4



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MATERIAL SAFETY DATA SHEET

2352 -01
Effective: 11/20/85

Lead, 1000 ppm (0.100% w/v)

Page: 4
Issued: 11/20/85

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION (Continued)

INTERNATIONAL (I.M.O.)

Proper Shipping Name	Nitric acid, solution
Hazard Class	8
UN/NA	UN2031
Labels	CORROSIVE

NA = Not Applicable or Not Available

The information published in this Material Safety Data Sheet has been compiled from our experience and data presented in various technical publications. It is the user's responsibility to determine the suitability of this information for the adoption of necessary safety precautions. We reserve the right to revise Material Safety Data Sheets periodically as new information becomes available.



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MATERIAL SAFETY DATA SHEET

L2347 -01

Lead, Granular or Shot

Effective: 05/12/86

Page: 1
Issued: 05/13/86

SECTION I - PRODUCT IDENTIFICATION

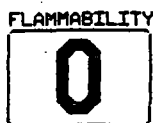
Product Name: Lead, Granular or Shot
Formula: Pb
Formula Wt: 207.19
CAS No.: 7439-92-1
NIOSH/RTECS No.: OF7525000
Common Synonyms: C.I. 77575
Product Codes: 4996, 2256, 2266

PRECAUTIONARY LABELLING

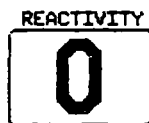
BAKER SAF-T-DATA™ System



NONE



NONE



NONE



NONE

Laboratory Protective Equipment



Precautionary Label Statements

WARNING!

MAY BE FATAL IF SWALLOWED

Keep in tightly closed container. Wash thoroughly after handling.

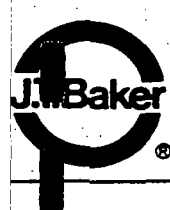
SECTION II - HAZARDOUS COMPONENTS

<u>Component</u>	<u>%</u>	<u>CAS No.</u>
Lead, Granular or Shot	90-100	7439-92-1

SECTION III - PHYSICAL DATA

Boiling Point:	1744°C (3171°F)	Vapor Pressure(mmHg):	N/A
Melting Point:	327°C (621°F)	Vapor Density(air=1):	N/A
Specific Gravity: 11.34 (H ₂ O=1)		Evaporation Rate: (Butyl Acetate=1)	N/A

Continued on Page: 2



J. T. Baker Chemical Co.

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24-Hour Emergency Telephone -- (201) 859-2151

Chemtrec # (800) 424-9300
National Response Center # (800) 424-8802

MATERIAL SAFETY DATA SHEET

LE 347 -01

Lead, Granular or Shot

Page: 2

Effective: 05/12/86

Issued: 05/13/86

SECTION III - PHYSICAL DATA (Continued)

Solubility(H₂O): Negligible (less than 0.1 %) % Volatiles by Volume: 0

Appearance & Odor: Grayish-white, silvery metal, with no odor.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point: N/A

Fire Extinguishing Media

Use extinguishing media appropriate for surrounding fire.

Special Fire-Fighting Procedures

Firefighters should wear proper protective equipment and self-contained breathing apparatus with full facepiece operated in positive pressure mode.

Toxic Gases Produced

lead fumes

SECTION V - HEALTH HAZARD DATA

Threshold Limit Value (TLV/TWA): 0.15 mg/m³ (ppm)

Short-Term Exposure Limit (STEL): 0.45 mg/m³ (ppm)

Effects of Overexposure

Ingestion may cause lassitude, weight loss, constipation, and anemia.
Ingestion may cause nausea, vomiting, paralysis, and central nervous system
Ingestion is harmful and may be fatal.

Chronic effects of overexposure may include kidney and/or liver damage.
Irreversible injury to blood forming tissue may result from chronic
low level exposure.

NOTE: Product is a solid mass; however, warnings come from inhalation of dust.

Emergency and First Aid Procedures

CALL A PHYSICIAN.

If swallowed, if conscious, immediately induce vomiting.

SECTION VI - REACTIVITY DATA

Stability: Stable

Hazardous Polymerization: Will not occur

Incompatibles: strong oxidizing agents, potassium metal, sodium metal

Continued on Page: / 3



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MATERIAL SAFETY DATA SHEET

L2342 -01

Lead, Granular or Shot

Page: 3

Effective: 05/12/86

Issued: 05/13/86

SECTION VII - SPILL AND DISPOSAL PROCEDURES

Steps to be taken in the event of a spill or discharge

Wear self-contained breathing apparatus and full protective clothing.
With clean shovel, carefully place material into clean, dry container and cover; remove from area. Flush spill area with water.

Disposal Procedure

Dispose in accordance with all applicable federal, state, and local environmental regulations.

EPA Hazardous Waste Number: D008 (EP Toxic Waste)

SECTION VIII - INDUSTRIAL PROTECTIVE EQUIPMENT

Ventilation: Use general or local exhaust ventilation to meet TLV requirements.

Respiratory Protection: None required where adequate ventilation conditions exist. If airborne concentration exceeds TLV, a self-contained breathing apparatus is advised.

Eye/Skin Protection: Safety glasses with sideshields, uniform, proper gloves are recommended.

SECTION IX - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATATM Storage Color Code: Orange

Special Precautions

Keep container tightly closed. Suitable for any general chemical storage area.

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

Proper Shipping Name Chemicals, n.o.s. (Non-regulated)

INTERNATIONAL (I.M.O.)

Proper Shipping Name Chemicals, n.o.s. (Non-regulated)

N/A = Not Applicable or Not Available

The information published in this Material Safety Data Sheet has been compiled from our experience and data presented in various technical publications. It is the user's responsibility to determine the suitability of this information for the adoption of necessary safety precautions. We reserve the right to revise

Continued on Page: 4



J. T. Baker Chemical Co.

222 Red School Lane Phillipsburg, N.J. 08865
24-Hour Emergency Telephone -- (201) 859-2151

Chemtrec # (800) 424-9300
National Response Center # (800) 424-8802

MATERIAL SAFETY DATA SHEET

D 347 -01

Lead, Granular or Shot

Page: 4

Effective: 05/12/86

Issued: 05/13/86

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Material Safety Data Sheets periodically as new information becomes available.



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National Response Center # (800) 424-8802

MATERIAL SAFETY DATA SHEET

S3458 -01
Effective: 10/07/85

Sodium Cyanide

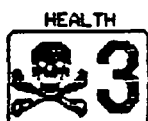
Page: 1
Issued: 10/09/85

SECTION I - PRODUCT IDENTIFICATION

Product Name: Sodium Cyanide
Formula: NaCN
Formula Wt: 49.01
CAS No.: 00143-33-9
NIOSH/RTECS No.: UZ7525000
Common Synonyms: Hydrocyanic Acid, Sodium Salt; Cyanogran
Product Codes: 3662

PRECAUTIONARY LABELLING

BAKER SAF-T-DATATM System



SEVERE



NONE



MODERATE



SEVERE

Laboratory Protective Equipment



GOGGLES



LAB
COAT



VENT
HOOD



PROPER
GLOVES

Precautionary Label Statements

POISON! DANGER!

EXCEPTIONAL CONTACT HAZARD - READ MATERIAL SAFETY DATA SHEET

MAY BE FATAL IF SWALLOWED OR INHALED

CONTACT WITH ACID LIBERATES POISONOUS GAS.

CAUSES EYE BURNS AND MAY IRRITATE SKIN.

Do not get in eyes, on skin, on clothing.

Do not breathe gas or dust. Keep in tightly closed container. Store
in dry area away from acids. Sweep up spillage. Do not flush to sewer.

SECTION II - HAZARDOUS COMPONENTS

Component	%	CAS No.
Sodium Cyanide	90-100	143-33-9

SECTION III - PHYSICAL DATA

Boiling Point: 1496°C (2725°F) Vapor Pressure(mmHg): N/A

Continued on Page: 2



J. T. Baker Chemical Co.

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MATERIAL SAFETY DATA SHEET

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Sodium Cyanide

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SECTION III - PHYSICAL DATA (Continued)

Melting Point: 563°C (1045°F)

Vapor Density(air=1): 1.7

Specific Gravity: 1.60
(H₂O=1)

Evaporation Rate: N/A
(Butyl Acetate=1)

Solubility(H₂O): Appreciable (more than 10 %) % Volatiles by Volume: 0

Appearance & Odor: White granules (odorless when dry).

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point: N/A

NEPA 704M Rating: 3-0-0

Fire Extinguishing Media

Use extinguishing media appropriate for surrounding fire.

Special Fire-Fighting Procedures

Firefighters should wear proper protective equipment and self-contained breathing apparatus with full facepiece operated in positive pressure mode.

Unusual Fire & Explosion Hazards

Closed containers exposed to heat may explode.

Toxic Gases Produced

hydrogen cyanide

SECTION V - HEALTH HAZARD DATA

Toxicity: LD₅₀ (oral-rat)(mg/kg) - 6.4

LD₅₀ (ipr-rat)(mg/kg) - 4.3

Effects of Overexposure

Contact with skin or eyes may cause severe irritation or burns.

Dust may cause headache, coughing, dizziness or difficult breathing.

Dust inhalation may be harmful.

Inhalation may be harmful or fatal.

Emergency and First Aid Procedures

KEEP CYANIDE ANTIDOTE KIT ON HAND AT ALL TIMES! If swallowed, if unconscious, break an amyl nitrate pearl in a cloth and hold lightly under nose for 15 seconds. When consciousness returns, induce vomiting.

If inhaled, break an amyl nitrate pearl in a cloth and hold lightly under nose for 15 seconds. Repeat 5 times at about 15 second intervals. If not breathing, give artificial respiration.

In case of contact, immediately flush eyes or skin with plenty of water for

Continued on Page: 3



J. T. Baker Chemical Co.

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MATERIAL SAFETY DATA SHEET

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Sodium Cyanide

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SECTION V - HEALTH HAZARD DATA (Continued)

at least 15 minutes.

SECTION VI - REACTIVITY DATA

Stability: Stable Hazardous Polymerization: Will not occur

Conditions to Avoid: moisture

Incompatibles: strong oxidizing agents, strong acids, water

Decomposition Products: hydrogen cyanide

SECTION VII - SPILL AND DISPOSAL PROCEDURES

Steps to be taken in the event of a spill or discharge

Wear self-contained breathing apparatus and full protective clothing.
With clean shovel, carefully place material into clean, dry container and cover; remove from area. Flush spill area with water.
Use water spray to reduce vapors.

Disposal Procedure

Dispose in accordance with all applicable federal, state, and local environmental regulations.

EPA Hazardous Waste Number: P106 (Acute Hazardous Waste)

SECTION VIII - INDUSTRIAL PROTECTIVE EQUIPMENT

Ventilation: Use adequate general or local exhaust ventilation to keep fume and dust levels as low as possible.

Respiratory Protection: A respirator with dust/mist filter is recommended. If airborne concentration exceeds capacity of respirator, a self-contained breathing apparatus is advised.

Eye/Skin Protection: Safety goggles, uniform, apron, proper gloves are recommended.

SECTION IX - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATATM Storage Color Code: Blue

Special Precautions

Keep container tightly closed. Store in secure poison area.

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J. T. Baker Chemical Co.

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MATERIAL SAFETY DATA SHEET

3458 -01
Effective: 10/07/85

Sodium Cyanide

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SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

Proper Shipping Name	Sodium cyanide, solid
Hazard Class	Poison B
UN/NA	UN1689
Labels	POISON
Reportable Quantity	10 LBS.

INTERNATIONAL (I.M.O.)

Proper Shipping Name	Sodium cyanide
Hazard Class	6.1
UN/NA	UN1689
Labels	POISON

N/A = Not Applicable or Not Available

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Chemtrec # (800) 424-9300
National Response Center # (800) 424-8802

MATERIAL SAFETY DATA SHEET

C4305 -01
Effective: 03/18/86

Chromium

Page: 1
Issued: 03/20/86

SECTION I - PRODUCT IDENTIFICATION

Product Name: Chromium
Formula: Cr
Formula Wt: 52.00
CAS No.: 7440-47-3
NIOSH/RTECS No.: CB4200000
Product Codes: 4961

PRECAUTIONARY LABELLING

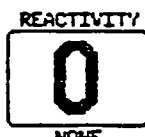
BAKER SAF-T-DATATM System



NONE



NONE



NONE



NONE

Laboratory Protective Equipment



Precautionary Label Statements

During use avoid contact with eyes, skin, clothing. Wash thoroughly after handling. When not in use keep in tightly closed container.

SECTION II - HAZARDOUS COMPONENTS

Component	%	CAS No.
Chromium	90-100	7440-47-3

SECTION III - PHYSICAL DATA

Boiling Point:	2200°C (3392°F)	Vapor Pressure(mmHg):	N/A
Melting Point:	1900°C (3452°F)	Vapor Density(air=1):	N/A
Specific Gravity: (H ₂ O=1)	7.14	Evaporation Rate: (Butyl Acetate=1)	N/A
Solubility(H ₂ O):	Negligible (less than 0.1 %)	% Volatiles by Volume:	0

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J. T. Baker Chemical Co.

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Chemtrec # (800) 424-9300
National Response Center # (800) 424-8802

MATERIAL SAFETY DATA SHEET

C-805 -01

Chromium

Page: 2

Effective: 03/18/86

Issued: 03/20/86

SECTION III - PHYSICAL DATA (Continued)

Appearance & Odor: Steel gray to silver pellets.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point: N/A

Fire Extinguishing Media

Use water spray, alcohol foam, dry chemical or carbon dioxide.

Special Fire-Fighting Procedures

Firefighters should wear proper protective equipment and self-contained breathing apparatus with full facepiece operated in positive pressure mode. Move containers from fire area if it can be done without risk. Use water to keep fire-exposed containers cool.

Unusual Fire & Explosion Hazards

Can be an explosion hazard, especially when heated.

SECTION V - HEALTH HAZARD DATA

Threshold Limit Value (TLV/TWA): 0.5 mg/m³ (ppm)

Effects of Overexposure

Prolonged contact may cause skin irritation.

Emergency and First Aid Procedures

INGESTION: If swallowed and the person is conscious, immediately give large amounts of water. Get medical attention.
INHALATION: If a person breathes in large amounts, move the exposed person to fresh air.
EYE CONTACT: Immediately flush with plenty of water for at least 15 minutes. Get medical attention.
SKIN CONTACT: Immediately flush with plenty of water for at least 15 minutes.

SECTION VI - REACTIVITY DATA

Stability: Stable

Hazardous Polymerization: Will not occur

Conditions to Avoid: flame

Incompatibles: carbonates, strong bases, mineral acids

SECTION VII - SPILL AND DISPOSAL PROCEDURES

Continued on Page: 3



J. T. Baker Chemical Co.

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Chemtrec # (800) 424-9300
National Response Center # (800) 424-8802

MATERIAL SAFETY DATA SHEET

C4305 -01

Chromium

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Effective: 03/18/86

Issued: 03/20/86

SECTION VII - SPILL AND DISPOSAL PROCEDURES (Continued)

Steps to be taken in the event of a spill or discharge

Wear suitable protective clothing. Carefully sweep up and remove.

Disposal Procedure

Dispose in accordance with all applicable federal, state, and local environmental regulations.

EPA Hazardous Waste Number: D007 (EP Toxic Waste)

SECTION VIII - INDUSTRIAL PROTECTIVE EQUIPMENT

Ventilation: Use adequate general or local exhaust ventilation to keep fume or dust levels as low as possible.

Respiratory Protection: None required where adequate ventilation conditions exist. If airborne concentration is high, use an appropriate respirator or dust mask.

Eye/Skin Protection: Safety glasses with sideshields, proper gloves are recommended.

SECTION IX - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATATM Storage Color Code: Orange

Special Precautions

Keep container tightly closed. Suitable for any general chemical storage area.

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

Proper Shipping Name Chemicals, n.o.s.

INTERNATIONAL (I.M.O.)

Proper Shipping Name Chemicals, n.o.s.

N/A = Not Applicable or Not Available

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Attachment F

Liquid Transfer Procedures

LIQUID TRANSFER PROCEDURES

I. PURPOSE

To establish requirements for the safe handling and transferring of liquid materials.

II. DEFINITIONS

- A. Flash Point: The lowest temperature at which a liquid gives off enough vapor to form an ignitable mixture with air and produce a flame when a source of ignition is present.
- B. Liquid: The state of matter in which the substance is a formless fluid that flows in accord with the law of gravity.
- C. Flammable Liquid: Any liquid having a flash point (closed cup) below 100°F and having a vapor pressure not exceeding 40 psia at 100°F.
- D. Combustible Liquid: Any liquid having a flash point (closed cup) at or above 100°F, but below 200°F.

III. GENERAL

Safe procedures for handling and transferring liquids.

- A. While using liquids, wear splashproof chemical goggles and know where the nearest eye-wash fountain is.
- B. To protect your skin, wear suitable gloves and protective garments where required.
- C. If your clothes become soaked with liquids, remove them and take a shower; don't put them back on until they're thoroughly dry.
- D. Smoke only in approved areas.
- E. Take precautions in cold-cleaning operations.

1. Keep your head back so you won't be in the direct line of escaping vapor.
 2. Wear suitable gloves when using solvents for wiping, dipping, spraying, or flushing.
- F. Use soap or mild detergent and water rather than solvents to clean grease, oil, dirt, or anything else off your skin.
- G. Place all rags, waste, paper towels, etc., soaked with solvent in airtight, all-metal safety containers.
- H. Store and transport small quantities of solvent only in approved safety container, properly marked.
- I. Ground and bond all metal containers when transferring a flammable or combustible liquid from one container to another.
- J. Make sure you have adequate ventilation when you use cold-cleaning solvents in a small room.
- K. Use respiratory equipment when you enter areas where the solvent vapor levels are-or might be-high. Don't rely on your nose to warn you of excessive concentrations-some dangerous vapors have no odor warning at all.
- L. Don't do any welding (or let anyone else weld) close to areas where solvents are being used. The heat of welding can cause dangerous solvent breakdown conditions, as well as fire or explosion.

What to do in case of emergency:

- A. If someone is overcome by solvent vapors
1. Get medical help immediately.
 2. Remove the person to fresh air.
 3. Loosen clothing.

4. Give artificial respiration if breathing has stopped.
5. Keep patient quiet and warm (but not hot).
6. Don't give anything by mouth to an unconscious person.

B. When a spill occurs

1. Evacuate the area (if it's a big spill).
2. Clean it up as soon as possible, wearing proper protective equipment.
3. If the solvent can't be reclaimed for further use, put it in a galvanized or stainless steel pail with a tight lid.
4. Later on, dispose of the solvent safely-don't pour it down a sewer.

C. In case of fire

1. Evacuate the area.
2. Trained personnel should extinguish the fire with carbon dioxide, dry chemical, foam, or a water fog.
3. Handle the burned solvent as though it were an acid.

Attachment G

Drum Handling Procedures

DRUM HANDLING PROCEDURES

I. PURPOSE

To establish requirements for the safe handling of drums in conjunction with other site activities.

II. GENERAL

- A. Drums and containers used during cleanup activities shall meet the appropriate DOT, OSHA, U.S. EPA regulations for the materials that they contain.
- B. Drums and containers shall be inspected and their integrity shall be assured prior to being moved. Drums or containers that cannot be inspected before being moved because of inaccessible storage conditions shall be moved to an accessible location and inspected prior to further handling.
- C. Unlabeled drums and containers shall be considered to contain hazardous substances and handled accordingly until the contents are positively identified and labeled.
- D. Site operations shall be organized to minimize the amount of drum or container movement.
- E. Prior to movement of drums or container, all employees exposed to the transfer operation shall be warned of the potential hazards associated with the contents of the drums or containers.
- F. DOT specified salvage drums or containers and suitable quantities of proper absorbent shall be kept available and used in areas where spills, leaks, or ruptures may occur.
- G. Where major spills may occur, a spill containment program shall be implemented to contain and isolate the entire volume of the hazardous substance being transferred.

- H. Drums and containers that cannot be moved without rupture, leakage, or spillage shall be emptied into a sound container using a device classified for the material being transferred.
- I. A ground-penetrating system or other type of detection system or device shall be used to estimate the location and depth of buried drums or containers.
- J. Soil or covering material shall be removed with caution to prevent drum or container rupture.
- K. Fire extinguishing equipment meeting the requirements of 29 CFR Part 1910, Subpart L shall be on hand and ready for use to control small fires.
- L. Whenever there is a reasonable possibility of a flammable atmosphere being present, material handling equipment and hand tools shall be of the type to prevent sources of ignition.

III PROCEDURES FOR OPENING DRUMS AND CONTAINERS

- A. Where an airline respirator system is used, connections to the bank of air cylinders shall be protected from contamination and the entire system shall be protected from physical damage.
- B. Employees not actually involved in opening drums or containers shall be kept a safe distance from the drums or containers being opened.
- C. If employees must work near or adjacent to drums or containers being opened, a suitable shield that does not interfere with the work operation shall be placed between the employee and the drums or containers being opened, to protect the employee in case of accidental explosion.
- D. Controls for drum or container opening equipment, monitoring equipment, and fire suppression equipment shall be located behind the explosion-resistant barrier.
- E. Drums and containers shall be opened in such a manner that excess interior pressure will be safely relieved.
- F. Employees shall not stand upon or work from drums or containers.

Attachment H

Excavation Procedures

EXCAVATION PROCEDURES

I. PURPOSE

To establish requirements to prevent injury and property damage during excavation work. The test pit excavation will be performed in accordance with OSHA 29 CFR 1926 subpart P Standards.

II. DEFINITIONS

- A. **Excavation:** Any man-made cavity or depression in the earth's surface, including its sides, walls, or faces, formed by earth removal and producing unsupported earth conditions by reasons of the excavation. If installed forms or similar structures reduce the depth to width relationship, an excavation may become a trench.
- B. **Trench:** A narrow excavation made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench is not greater than 15 feet.
- C. **Slope:** The angle with the horizontal at which a particular earth material will stand indefinitely without movement.

III. GENERAL

- A. Before any attempt is made to excavate, public utilities shall be checked for locations of underground pipe or electric lines.
- B. No shovel, dragline, or other digging machine shall be allowed to excavate close to underground facilities that must be left in place. A proximity limit for machine operations shall be established and the excavation completed by hand digging.
- C. If the excavation is deeper than 5 feet, adequate shoring and bracing shall be provided or the excavation must be appropriately sloped.
- D. If underpinning (deeper support under an existing column, wall, or machine) is necessary, it shall be done before the excavation is carried down to final grade.
- E. Material excavated by machine shall be thrown at least 24 inches from the edge of the excavation, but not into other work areas.

- F. Pick-and-shovel people working in excavations shall be kept far enough apart to prevent injury to one another.
- G. Hand excavated material shall be placed at least 24 inches from the side of the excavation, unless toe boards or other effective barricades have been installed to prevent fallback.
- H. Excavations shall be barricaded to prevent employees and others from falling into them. When an excavation must be left open for the duration of the construction work, barricades and warning signs shall be used.
- I. A trench four feet or more deep shall be provided with ladders to facilitate safe entrance and exit. Ladders shall be spaced such that no worker in the trench will ever be more than 25 feet from a ladder.
- J. Any ladder in a trench shall extend from the bottom of the trench to at least three feet above the surface of the ground.



Attachment Z

Site Health & Safety Plan Acknowledgement Form

SIGNATURES

I, _____, (Site Safety Officer) have discussed this Safety Plan with the employee assigned to the project.

I, _____, have read and discussed this plan with the company official noted above. I understand all aspects of the plan and agree to follow all instructions detailed above.

I, _____, have read and discussed this plan with the company official noted above. I understand all aspects of the plan and agree to follow all instructions detailed above.

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